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Engineering News-Record

Devoted to Civil Engineering and Contracting

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Women and Children Working on a Masonry Irrigation and Power Dam Across the Kaveri River in India

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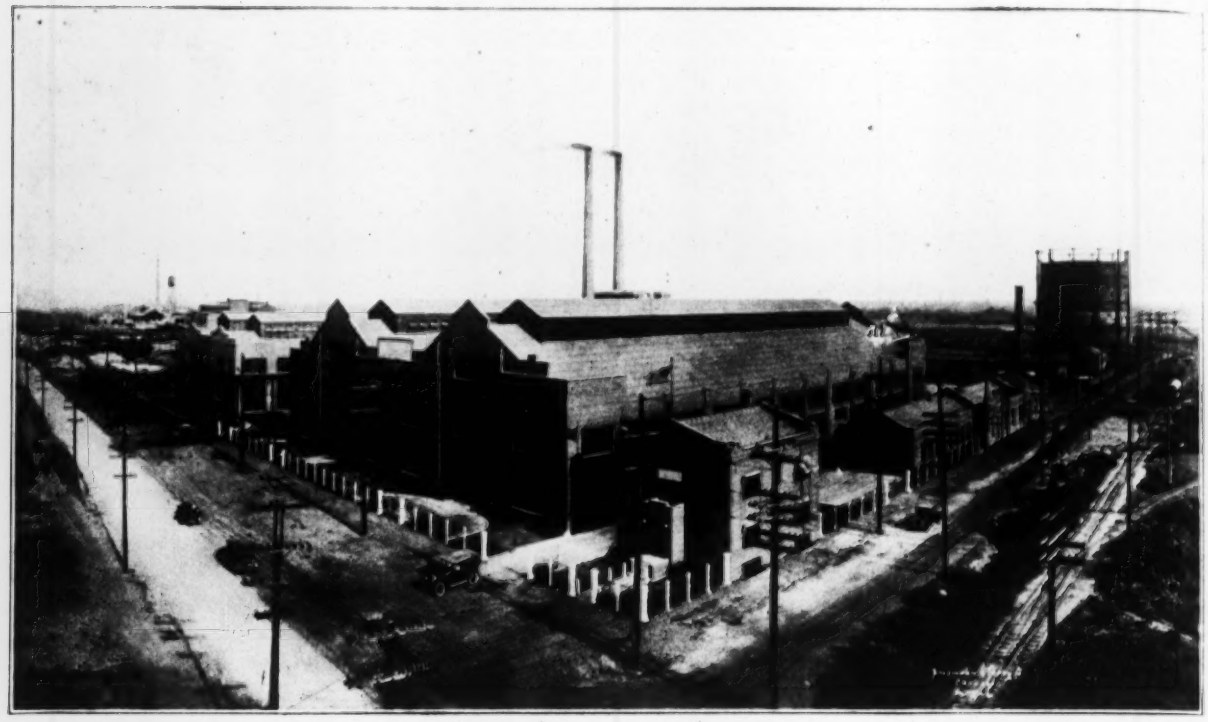

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ENGINEERING NEWS-RECORD

DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

E. J. Mehren, Editor

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Engineering College Registration

RESULTS of the census of engineering college registration by *Engineering News-Record*, presented elsewhere in this issue, are interesting chiefly because they show that attendance has again become about normal after the violent fluctuations caused by the World War. This year's gain of 4 per cent indicates conditions of healthy, but not of abnormal, growth. The unusually large freshman registration in the year following the armistice has not been repeated. In fact, every course during the 1920-21 term shows a decrease in freshman registration as compared with 1919-20, but in spite of this condition the total registration has gained, due, among other things, to the return to collegiate work of men formerly in the military or naval service. Undoubtedly the war stimulated the desire for an engineering education, but many of the men aspiring to be engineers were found, soon after their entry into college, unqualified for the work and dropped out. The figures indicate that mechanical engineering is the most popular course, with electrical engineering running a close second. Civil engineering comes third in volume of registration, followed in order by chemical and by mining engineering. Massachusetts Institute of Technology, with a registration this year of 2,747 students, is the largest of our engineering institutions, although there are 14 colleges with a registration exceeding 1,000 engineer students. With the exception of three these are state universities. Nothing startling is revealed by a study of the figures. They are negative rather than positive. They indicate a condition which is summed up well by Dean Turneaure, of the University of Wisconsin, when he says that the war merely made a deep notch in the registration curve. This year has brought registration back nearly to the normal line.

The Joint Committee Reports

TWENTY-FIVE men have the responsibility for the standard specifications for concrete which the Joint Committee will issue in final form inside the next eighteen months, but every engineer interested in concrete will have an opportunity to have a part in their formulation. Last week at the meeting of the American Society for Testing Materials the preliminary report was made public and in the form now written it will be circulated among the members of the five contributing societies, which means about 16,000 engineers. For a year it will be the subject of discussion among those engineers and then the committee will proceed to the writing of the final specifications in the light of its own deliberations and of the discussions. Such procedure is common for committee reports but in this case it takes on added interest because of the number of societies involved and the importance of the subject matter. The accepted specifications finally prepared by this committee will govern concrete design in this country for many years. Here and there will be some independent spirits who persist in their own views regardless of the dicta of the Joint Committee, but by and large the authority for the specifications will be rarely disputed. For this reason a great obligation rests on the committee's members to consider and to study the preliminary draft and the comments on it which they will receive. That draft is now only a "trial balloon" and is to be accepted as such, but the profession looks for a finished piece of work which will stand until something radically new is discovered about concrete.

The Construction Industry

IT IS a common failing for individuals, associations, and institutions to exaggerate their own importance. That failing, however, cannot be charged against the construction industry. It has done its work year in and year out without making demands for recognition as one of the chief activities in American industrial life. Yet a special bulletin of the United States Chamber of Commerce advises that one-fourth of our national wealth is represented by the structures and projects built by the construction industry. Of course, this is past production, but the current importance of the industry is indicated by the fact that one-fourth of the persons engaged in manufacture are working on materials and products that the constructor will use. The reason that construction is not ordinarily visualized in this big way is that we have heretofore considered it made up of many industries and have not tried to think of these industries as a group. We speak of the cement industry, the lumber industry, the clay products industry, etc., without visualizing their relation to the construction whole. Much good will undoubtedly come to every one concerned with construction if the public can be brought to an appreciation of the importance of the industry as a whole. First, however, we must have a proper appreciation ourselves, and that must come through a closer relationship between the various factors—engineers and architects, contractors and builders, and manufacturers of materials and equipment.

Relief from National Agreements

IN APRIL the Railroad Labor Board decided that the working agreements on the railroads would cease July 1, and directed the railroads and their employees to negotiate new agreements. The decision was widely heralded as sounding the death knell of the onerous and unreasonable conditions that were forced upon the railroads during the war. However, the progress to date in the negotiating of the new agreements has been very unsatisfactory. The employees have been holding out, in negotiations with individual roads, for individual agreements which would duplicate exactly the terms of the present national agreements. Obviously, the country will gain nothing by the perpetuation,

through a lot of individual contracts, of the present working conditions. It looks as though the whole matter will be thrown back to the Railroad Labor Board, which will then have to go into the whole situation for a determination of rules that are reasonable. This is much to be regretted, since, as has been pointed out repeatedly in these columns, the railroad situation is the key of the whole labor problem. Over-payment of railroad labor is demoralizing to every industry in the land. Public welfare demands the rewriting of the agreements not only on reasonable grounds, but with a view to labor conditions and local living costs.

Regulating Trade Associations

IN CLOSING the work of the Lockwood Committee, Samuel Untermyer, its chief counsel, recommended, among other things, that trade associations be put under rigid federal supervision and that those who participate in trade organizations not supervised or sanctioned by federal authority be subject to criminal prosecution. Mr. Untermyer has uncovered flagrant combinations that might have been prevented had there been such supervision as he favors. We may have to come to such supervision, despite the fact that it will be costly and further increase our governmental machinery. As a first step we might try a more intelligent functioning of the Federal Trade Commission, by making its duties advisory and helpful rather than inquisitorial. There are many functioning associations which are anxious to keep within the law but which cannot find out what the law actually means. To safeguard the public resort to strict supervision may be necessary, but we should like to see the advisory method tried.

The Prize-Fight Stadium

THE Dempsey-Carpentier prize-fight cannot last longer than forty-eight minutes. It may last only ten—but this is not a sport editorial. The stadium in which the fight is to be held, the construction of which is described on p. 1112 of this issue, cost $250,000 and was constructed primarily for the fight. It is to be torn down within a few months, and its salvage value is small. While industrial establishments that produce household articles of every-day need have not a dollar for new construction, such amusement places as the stadium spring up almost over night. Not a week passes but it brings news of the construction of a score of new theaters. Practically the only industrial building being done now is in garage construction. It is a universal human trait that man economizes little where his pleasure is involved. An exercise of the same generous spirit where his real needs are concerned would precipitate a building and business boom that would be prodigious.

High Freight Rates

Freight rates on most construction materials are in relatively high proportion to their cost. Therefore, the construction industry has taken an active part to bring about reductions, following the percentage increases that have somewhat more than doubled railroad rates since 1913. It has been often urged that consideration be given to relieve many low-grade commodities, in short haul, of the additional horizontal increase of 40 cents per ton, established by the famous order No. 28 of the Director General, the effect of which was magnified by last summer's percentage increase. Meantime representatives of the construction industry have met with the carriers with a view to reduction or adjustment of rates on construction materials. Following this discussion, the carriers declined to grant the reductions requested, but it was admitted that the percentage increases in many cases have thrown rates out of line. It was also admitted that there are instances in rates on roadbuilding materials, and other traffic, which should be considered as emergencies. This journal and its predecessors have always favored sufficiently high rates to permit the railroads normally to earn a fair return on the value of their properties. It begins to be clear, though, that with the present level of railroad rates many materials have become marginal commodities, hard hit in competing for markets by the addition in transportation cost that must be included in selling price. Revision of the rate structure to adjust such inequalities appears to be an urgent matter. Before it can be accomplished in a comprehensive way, "emergencies" will have to be dealt with. But it should not be lost sight of that the process of going over the whole rate structure to correct even the most serious inequalities is an exceedingly intricate and tedious undertaking that will require months of time.

Paving Research Results

FURTHER results of its program of research work are announced this month by the U. S. Bureau of Public Roads. Since Nov. 13, 1919, accelerated wear tests on sections of granite block, brick and concrete pavement have been in progress at the Arlington (Va.) experiment station, where a device carrying five 1,000-lb. cast-iron wheels, each 2 in. wide, has operated back and forth over a runway 400 ft. long, made up of 48 strips of pavement of different materials and types of construction.

Impact again looms up as one of the highway engineer's arch-enemies; in the case of granite paving this causes the need for smoothly cut block to be stressed. The results show that when accurate cutting is obtained the so-called softer granites, which have been under the ban in many localities as a paving material, are as resistant to steel-tired traffic as the harder variety. It would appear, therefore, that discrimination against certain quarries in the past has not been justified and that their products should find a more extended use in municipal paving programs, provided, of course, that requirements as to careful cutting and laying are enforced. Another significant disclosure is the serviceability of the bituminous filler, which, it is shown, acts as a cushion against impact stresses—a feature lacking in the rigid cement-grouted type. It is stated definitely, in fact, that under the practical conditions approximated by the Arlington tests bituminous filler are, in general, as satisfactory as cement-grout fillers, especially when there is any tendency of the block to settle unevenly, thereby increasing the impact force exerted by moving wheels. In the cases of both granite block and brick the sand-cement cushion was more satisfactory than plain sand.

Due to space limitations it has been impossible for this journal to present more than the general conclusions of the tests; the full report, however, has been published by the U. S. Bureau of Public Roads and its findings constitute a substantial addition to the all too meagre supply of paving research data.

Inspiration to New Activity

IN THE REPORT of the meeting of the American Society for Testing Materials, elsewhere in this issue, appears the statement that the society passed approval on some forty or fifty steel specifications in as many seconds, by a blanket vote. This, we believe, represents an achievement exceeding all prior records. No such highly routinized procedure of turning out results has been witnessed in the deliberations of this or any other technical society. Perhaps the term "deliberations" is inappropriate; there cannot be much deliberative procedure in such wholesale voting. Yet the action reported is not to be criticized offhand, but on the contrary represents a noteworthy achievement. It marks the culmination of twenty years of progress, a generation of growing strength and confidence-inspiring quality of committee work.

In the face of this achievement, however, the question presents itself whether the time has not come for turning back to greater deliberation in the society, truer joint thinking concerning the common purpose. In the opinion of *Engineering News-Record* this question is intertwined with that raised a year ago in the presidential address of J. A. Capp: Shall the society give more conscious attention to study of the properties of materials and their suitability to various uses? The society is in need of an intellectual incentive, an inspiration, equally with respect to its specification work and with respect to its technical papers.

Recent years have brought to view an increasing formalization of the society's meetings. In the language of some members, the meetings have often been oppressively "dead." A growing lack of discussion of committee recommendations has been observable; unquestioned acceptance of reports came to be a habit. This is not a healthy condition.

At bottom of this development there were two factors, if we appreciate the situation rightly: first, well-established confidence on the part of the members in the judgment and representative character of the committees; second, a more or less conscious inclination to discount or even frown down opposition in open meeting, on the sound theory that much hard work and honest purpose may be defeated by one or two ill-informed objectors able to impress their audience. In the light of these reasons the resulting machine-like system appears justified; and yet it is necessary to say that the effect is deadly. The society has become a machine—a highly perfect one, yet a machine.

With this perfection of machine-like operation of the society's committee system, exemplified in the smooth acceptance of the steel report, further progress is likely to be toward deterioration. The committees have grown strong, but the society has grown weak and listless. Even now there is legitimate question whether the general society retains sufficient vigor to cope with its committees, or whether the tail does not sometimes wag the dog; and if the results hitherto have all been safe and commendable it is in spite of, not because of, the control of real work by committees.

It is pertinent to suggest—though this is somewhat aside from the present purpose—that the time may have come to transfer all committee work of the society from private to public status. It is a long-standing tradition that committees should work in closed sessions, but the functions of the American Society for Testing Materials and its committees are much too important to be bound by tradition if it threatens the soundness of the results.

So long as a committee is not all-inclusive but is merely representative of the interests involved, its work may safely be done in private; the open meeting of the society can be counted on to scrutinize, question, and check up the committee's reports. But when, as has come to be the aim in this society, all interested parties are brought together in the committee, the power to check up the results in open meeting is paralyzed. There is unlikely to be any thorough detail knowledge of the subject outside the committee, and the society is therefore powerless to go behind the returns. Under such conditions no supervision of committee work is possible unless the work is done in open sessions.

Effective co-operation of all elements of the society would be promoted by such a system, we venture to suggest, and therewith the society's easy and rapid progress toward dull lifelessness would be checked. But the mere change of system would do little toward supplying a new vital force, and it is only by such a force that the present perfected machine can again be transformed into a living thing.

The proposal that the study of materials be cultivated as a distinct major phase of the society's work contains the promise of new vitality for the society. This proposal has been under consideration for a year. Much thought has been given to it, apparently, but no active conclusion has been reached. The importance of bringing into action a new inspiration for fruitful activity within the society warrants the hope that a conclusion may soon be reached.

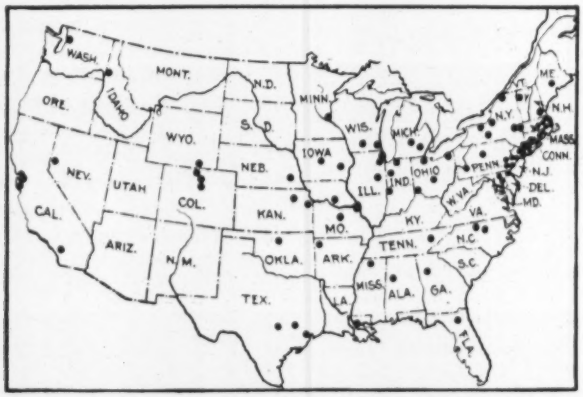
Active work in the technical field with no reference to specifications would give to the general meetings of the society a purpose and direction which they now lack. Through its inspiration, we may hope, thought in the field of testing and materials would again attain such a growth that specification-making would appear in its true light as a by-product rather than an end in itself. An inexhaustible wellspring of life for the society would be created. But only specific initiatory steps on the part of the governing authorities of the society can enlist the membership in the larger field of work: mere suggestion, though it be a president's, is ineffective.

Already a realignment of the society's work has been initiated, in most promising manner. Co-ordination of the study of testing methods and control of terminology have been placed in charge of central committees so constituted as to work by co-operation rather than dictation. Through this and perhaps further co-ordination, the specification committees can be relieved of much of the formal detail in which they are now involved, and they will then, with attention solely to the technical tasks entrusted to their care, be able to work yet more efficiently than hitherto. At the same time steps have been taken to draw the society membership and the committees into a closer circle, by the inauguration of a quarterly bulletin of the society for the avowed purpose of keeping the membership more closely informed on committee work. These several steps all tend to strengthen the technical spirit, both of the committeeman and of the general member.

With improvement of the society's mechanism, thus initiated, there should now be joined the inspiration of a new purpose. Its vitalizing force is needed. Its influence would surely recall the society from its threatened lethargy, and would cause productive activity to displace the dull routine of some of the past sessions.

Engineering College Registration Shows 4-Per Cent Gain

Census by "Engineering News-Record" Covers 48,312 Students in 81 Institutions Located in 36 States—Mechanical Engineering Most Popular Course



THE GEOGRAPHICAL DISTRIBUTION OF ENGINEERING COLLEGES IN "ENGINEERING NEWS-RECORD'S" CENSUS

"Engineering News-Record" presents herewith the results of a census which it has made of the registration at engineering colleges throughout the country. The chief objects of the inquiry were to compare the figures for the collegiate year just ended (1920-21) with those of the preceding year (1919-20), with a view to determining whether the general demand for engineering training is increasing or decreasing, and to what extent, and which of the several specialized courses of study—civil, mechanical, electrical, mining, and chemical engineering—are attracting the most students. In other words, the census aims to present figures which indicate the general status of technical education as regards college attendance.

THE statistics of engineering college registration in this article are based upon returns from 81 institutions in 36 states, and show a total registration for the college year 1920-21 of 48,312 students in all engineering courses as against 46,395 for the previous year—a gain of 4.1 per cent. This gain is noteworthy in view of the fact that this year's freshman classes totaled 18,073 students as against 20,357 last year—a loss in freshman registration of 2,284 or 11.2 per cent.

War's Influence Felt

The apparent paradox presented by a gain in total registration in spite of a decline in the number of men entering college in the freshman class is accounted for by a combination of circumstances all growing out of the war. Many undergraduates who discontinued collegiate work to enter the military or naval service returned to their universities this year to complete their courses, so that the three upper classes at the beginning of this year received more than the normal number of "new" students, most of whom had a year or more of college training to their credit.

Another fact worth emphasizing is the war's effect in stimulating interest in engineering education. Reports of the activities of our technical troops overseas apparently fired the imaginations of a large number of young men, who decided to become engineers. The result was that at the beginning of the college year 1919-20, following the armistice, the freshman classes in many institutions were abnormally large.

The following comment from Dean Douglas S. Anderson, of Tulane University, New Orleans, where the freshman class this year numbered 69 as against 113 for 1919-20, is significant: "We account for the rather abnormal increase in the freshman class in 1919-20 by the sudden great stimulation given to technical education from the experiences of the war. Our experience indicates, however, that many of these men who just came in, were not at all adapted to engineering and soon dropped out." Dean Anderson's explanation, therefore, if it can be applied generally, would account for the freshman increase last year and also for the decline this year. The general process of after-war deflation, apparently, is operative in our engineering institutions as well as in industry.

How Statistics Were Compiled

Blank forms requesting the student registration statistics were sent to 118 engineering institutions, of which 81 colleges, or 69 per cent, replied. The geographical distribution of the colleges sending in returns is indicated on the accompanying map. Before the figures were compiled it was necessary to make certain adjustments to bring them to a common basis, due to the fact that in some institutions freshmen are not classfied according to the five specialized courses listed in the questionnaire, but are grouped into one general body and after the first year assigned to civil, mechanical, or other specialties. In such cases the procedure was to allocate the freshmen to the several specialties and to "miscellaneous" engineering courses in the same ratio as obtained for the three upper classes. Another adjustment of the figures was required in the cases of those institutions where, for example, the electrical and mechanical courses are combined. In such instances half the men reported were arbitrarily assigned to mechanical engineering and half to electrical engineering. This assumption seemed reasonable because the total figures for this year disclosed a registration of 12,159 students in mechanical engineering and 12,118

in electrical engineering—practically an equal division.

An effort was made to confine the statistics to purely engineering courses. Some of the colleges, for example, included in their returns registrations in courses of agriculture, commerce, forestry, etc. The returns under these headings were eliminated. There were included, however, under a column of "miscellaneous" courses, such subjects as architectural engineering, industrial management, fire protection engineering, commercial engineering, textile engineering (an important course in one of the Southern colleges), naval architecture, and similar strictly engineering specialties.

Mechanical Engineering Most Popular

Table I gives a summary of the registration statistics for the 81 engineering colleges reporting for the years 1919-20 and 1920-21. It will be noted that, with respect to the *total* registration, all courses except chemical engineering showed a gain this year over last year. In the case of the *freshman* registration, on the other hand, a loss is shown in every column. During 1919-20 the freshman registration amounted to 43.8 per cent of the total college registration, while this year the freshman were 37.4 per cent of the total.

The figures show that mechanical engineering is the most popular course in our technical colleges. This

TABLE I. SUMMARY OF RETURNS FROM 81 ENGINEERING COLLEGES, SHOWING BOTH TOTAL AND FRESHMAN REGISTRATION

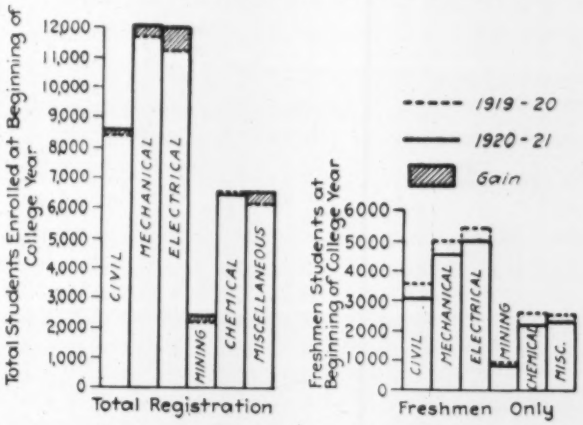
Year	Civil	Mech.	Electr.	Mining	Chem.	Misc.	Total
1919-20 (total)	8,469	11,693	11,285	2,252	6,588	6,108	46,395
1920-21 (total)	8,592	12,159	12,118	2,431	6,486	6,526	48,312
Gain (+) or loss (—)	+123	+466	+833	+179	—102	+418	+1,917
1919-20 (Freshmen only)	3,612	5,089	5,487	903	2,652	2,614	20,357
1920-21 (Freshmen only)	3,046	4,607	5,089	780	2,249	2,302	18,073
Freshman Gain (+) or loss (—)	—566	—482	—398	—123	—403	—312	—2,284

year 12,159 students were registered in this specialty and last year 11,693, a gain of 466. Electrical engineering runs mechanical engineering a close second, the figures for this year and last year being, respectively, 12,118 and 11,285, or a gain of 833. Civil engineering comes third with 8,592 undergraduates this year and 8,469 last year. Chemical engineering, with about 6,500 students for the past two years, takes fourth place, while the mining engineering course, in fifth place, shows a considerably smaller registration than any of the others—2,431 this year as against 2,252 last year. A reference to Table 2 indicates the percentage relation of the registration in the several special courses to the total, and also the freshman percentages.

Of the 81 institutions sending in returns, 51 reported gains in total registration, 29 losses, and 1 no change. In freshman registration alone, however, 49 colleges reported losses as against 30 reporting gains, figures for two institutions not being available.

Fourteen Pass 1,000-Mark

Fourteen of the colleges are giving engineering instruction to 1,000 or more students. The highest registration figures are reported by the Massachusetts Institute of Technology, Cambridge, Mass., with 2,747 students. Next in point of size comes the University of Michigan, Ann Arbor, Mich., with 2,212; third, Purdue University, Lafayette, Ind., with 1,845; fourth, Cornell University, Ithaca, N. Y., with 1,825, and fifth, the University of Illinois, Urbana, Ill., with 1,818. The other nine institutions above the 1,000-mark are, in order of size, as follows: Ohio State University, 1,473;



TOTAL AND FRESHMEN REGISTRATION AT BEGINNING OF COLLEGE YEARS 1919-20 AND 1920-21

University of California, 1,323; Georgia School of Technology, 1,307; University of Minnesota, 1,284; Pennsylvania State College, 1,233; Texas Agricultural and Mechanical College, 1,169; University of Wisconsin, 1,150; Rensselaer Polytechnic Institute, 1,039; Iowa State College, 1,011.

The largest gain in registration this year is shown by Cornell, with 395 more students than in 1919-20. Massachusetts Institute of Technology comes next with an increase of 367. The greatest loss in total registration was suffered by the Carnegie Institute of Technology, with 246 less students this year than last. The next greatest loss was sustained by the University of Minnesota, with 162. The University of Mississippi, with 48 engineering students this year, showed the smallest total registration.

The curriculum of the Massachusetts Institute of Technology is the most highly specialized of any of the colleges. In addition to the five basic engineering courses listed in the questionnaire, there were reported courses in the following specialties: Architecture, chemistry, biology and public health, physics, general science, general engineering, sanitary engineering, geology, naval architecture, electro-chemical engineering, engineering administration, aëro engineering and mathematics. At the Stevens Institute of Technology, Hoboken, N. J., on the other hand, a single course, mechanical engineering, is offered.

TABLE II. PERCENTAGE RELATION OF SPECIAL COURSES TO TOTAL AND TO FRESHMAN REGISTRATION

Course	Per Cent of Total Registration 1919-20	Per Cent of Total Registration 1920-21	Per Cent of Freshman Registration 1919-20	Per Cent of Freshman Registration 1920-21
Civil	18.2	17.8	17.8	17.0
Mechanical	25.2	25.2	24.7	25.6
Electrical	24.3	25.1	27.1	27.8
Mining	4.8	5.0	4.5	4.3
Chemical	14.2	13.4	13.1	12.5
Miscellaneous	13.3	13.5	12.8	12.8
Total	100.0	100.0	100.0	100.0

For 1919-20 Freshman registration was 43.8 per cent of the total and for 1920-21 it dropped to 37.4 per cent.

At a few institutions engineering is a post-graduate course requiring, in the case of Columbia University, three years of college work for admission. At Harvard

students may register in the college for the first two years of the engineering program and transfer, without loss of time, at the end of either the first or second year to the engineering school, provided they have chosen courses with this end in view. At Yale students in the freshman and sophomore years are not divided into specialized groups, but are classified under the head of "engineering science." At the State University of Iowa segregation of the students into special courses occurs only in the senior year. In fact, there are fifteen or twenty returns indicating that classification in the special courses does not occur until after the completion of the freshman year.

At some colleges it has been found necessary to limit the number of entering students, due to the lack of facilities for handling more than a specified number. At Lehigh University and elsewhere the enrollment in 1919-20 was abnormally large, due to the presence of students returned from war service. When it appeared that the freshman enrollment at Lehigh would be equally large for 1920-21, according to Raymond Walters, registrar, the university limited the freshman class to 400 in all courses, including art, science, and business administration. No more applicants were accepted after Aug. 11, 1920. The definite policy of Lehigh University has been to limit the entering class to a number for which adequate facilities are afforded.

Selecting Students at N. Y. U.

New York University is going a step further by "selecting" its new students. Every candidate must be ready from the academic point of view; otherwise he is not considered. He must also pass personnel and psychological tests on the basis of which, according to Dean Charles H. Snow, a large number of men are refused admission. This course has been found necessary because the university wishes to reduce freshman mortality and to restrict the size of the undergraduate body to the facilities provided.

Commenting upon present conditions in the engineering college at the University of Wisconsin, Dean F. E. Turneaure has summarized the situation in these words: "The upper classes are now feeling the effect of the large increases in the lower classes of last year and our facilities are taxed to the limit. The entering class this year is slightly less than last year, numbering about 400 and the total attendance at the college is about 1,200. This is an increase of 70 per cent over the pre-war average and represents a total attendance which just about corresponds to a freshman class of 400. It is likely, therefore, that the attendance will remain about stationary at the present figures for the next three or four years."

Dean Turneaure finds that the present attendance at the University of Wisconsin is about what would have been predicted by an extension of the curve of growth prior to the war. That is to say, the effect of the war was merely to make a deep notch in this curve and recovery since the war has brought the registration back nearly to the normal line.

Pennsylvania State College, Dean R. L. Sackett reports, refused entrance to 1,100 students in September, 1920, about 400 to 450 of whom would have been freshman engineers. In 1919 the college was unable to receive between 300 and 400 because of lack of facilities. At Leland Stanford, Jr., University, California, Prof. Charles D. Marx reports, the number of first-year students is limited to 450 for the autumn quarter and 50 additional for the winter and spring quarters. At this institution all first- and second-year students are registered in the lower division and not in any special department.

Statistics from 14 Representative Colleges

Conditions in our technical colleges were so disarranged during the war that a comparison of this year's registration figures with those of 1917 and 1918 are of little value except as an index of an abnormal and temporary state of affairs. As a matter of passing interest, however, Table III, containing composite registration figures for fourteen colleges, selected so that all geographical divisions of the country might be represented, are given for the four college years beginning in the fall of 1917. Representing the East, in Table III, are the Massachusetts Institute of Technology, Cornell, Pennsylvania State College, and the University of Pennsylvania; for the Middle West, University of Illinois, Iowa State College and University of Wisconsin; for the West, University of Idaho, Colorado School of Mines, and Texas Agricultural and Mechanical College; for the South, Georgia School of Technology and University of Alabama; and for the Pacific Coast, University of California and University of Washington.

TABLE III. FIGURES FROM 14 REPRESENTATIVE COLLEGES SELECTED GEOGRAPHICALLY—1917-1921

No. and Location of Colleges	1917–18	1918–19	1919–20	1920–21	Per Cent Gain 1917–1920
Four, East	3,756	4,199	5,753	6,444	72
Three, Middle West	2,000	2,643	3,976	3,979	99
Three, West	708	1,583	1,739	1,757	148
Two, Pacific Coast	828	1,466	1,463	1,482	79
Two, South	978	1,317	2,216	2,169	122
Total	8,270	11,208	15,147	15,831	91
Yearly gain per cent	.....	35.5	35.2	4.5	...

The foregoing list is balanced, geographically, and includes large and small institutions as well as private and state universities. On the basis of these figures this year's registration is 91 per cent greater than that of the college year 1917-18. Starting with the college year 1917-18 the yearly increases are 35.5 per cent, 35.2 per cent, and 4.5 per cent. The latter figure, based on the returns from the fourteen selected colleges, agrees closely with the 4.1 per cent gain computed from the returns of the 81 institutions this year.

A marked difference in the percentage gains from 1917 to 1920 is shown by the geographical groups above noted. The four Eastern colleges increased 72 per cent, while the three Western institutions increased 148 per cent, with the others between these limits. These figures, however, should be interpreted as showing an abnormal condition of affairs four years ago. In other words, the percentages are high, not because an unusually large number of students registered this year, but because there was a decided slump in the year 1917.

Reverting, finally, to this year's statistics for the 81 colleges, it would seem that conditions have again become stabilized as shown by the 4 per cent gain this year over last year. In conclusion it should be pointed out that this year's registration of 48,312 students represents only the 81 engineering institutions answering this journal's questionnaire; the total number of students studying engineering through the country is considerably larger than this figure.

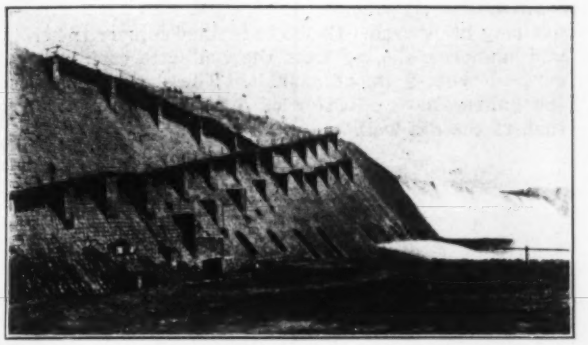
Indian State Builds a Power and Irrigation Dam

Dam Now Under Way on Project in State of Mysore One of Large Masonry Structures of the World

By E. W. T. Slater
Hassan, Mysore State, India

INDIA has long been famous for its irrigation developments. In the State of Mysore, particularly, a great deal of attention has been paid to this subject, and in the two great projects, the Marikanave Dam and the Krishnaraja Sagara Project, are two splendid instances of what can be accomplished by engineering skill. These schemes have made cultivable large districts which would otherwise have been continually threatened by a famine.

The river Kaveri, which runs through the Mysore



KRISHNARAJA SAGARA DAM ACROSS THE KAVERI RIVER IN INDIA
Ramps built for workmen during construction.

State and then through the Madras Presidency, is looked upon by the people of South India as endowed with great sanctity, in fact it is called "The Ganges of the South," for there are millions of people who are entirely dependent on its supplies for their livelihood. Every year the rains come in the monsoon season and the river becomes a mighty life-giving power to the farmers whose lands lie in the vicinity. Yet for six months of the year, the flow of water will hardly suffice to irrigate a fraction of the land that could be cultivated were it possible to conserve the heavy monsoon flow. By means of anicuts something has been done, but the government of Mysore, realizing the great advantage of a huge dam across the river, prepared several schemes, but the one finally decided on was that now known as the Krishnaraja Sagara Project, after the ruling prince of Mysore. The work has now reached an advanced stage, though it is estimated that it will require two more years to complete the whole scheme.

The objects for which the dam has been raised are two. In the first place, the Mysore Durbar was anxious to increase greatly the area of cultivable land, and to assure the farmers of an unfailing supply of water throughout the year. In the second place, it was necessary to increase the supply of water for the large electrical power works situated at Sivasumudrum, lower down the river, as there were periods of the year when this supply was in danger. The Kolar gold fields are consumers of large quantities of electrical power, and their increased demands have placed a great strain on the capacity of the present available supply of water. With these two objects in view the Mysore government felt justified in beginning a scheme which would involve the expenditure of large sums of money, and prove a strain on the finances of the states.

The storage reservoir, when the dam is complete, will be 41,500 million cu.ft. The lake thus formed will be over forty miles in circumference. Such a wide area of water will seriously affect a considerable number of villages, for the total acreage of submerged land is nearly thirty thousand acres. About twenty villages will be wholly or partially submerged, and over ten thousand persons rendered homeless. It was therefore necessary in considering the scheme to see what provision could be made for these people, and a careful survey of the whole resulted in a plan for their emigration to other lands, each family receiving a just compensation for its losses. Houses have been erected in the new districts by the farmers with the assistance of the government, and the government is taking advantage of the opportunity thus afforded of building model villages which ought to serve as a useful object lesson to the surrounding villages.

The final height of the dam, which is of rubble masonry, with cut stone faces, will be 120 ft., but it is proposed to build this in two stages, the first sufficient to store 80 ft. of water. When the full height is reached, the water supply will be enough to guarantee all the demands made for electric power, and provide also irrigation for over half a million acres of land. The excavation and clearing of the foundations for the masonry dam was complicated by the fact that no work could be executed

ROCK CUT FOR THE FOOTINGS OF THE KAVERI RIVER DAM

in the river bed for at least six months of the year, during which the river carried a discharge varying roughly from 6,000 to 150,000 cu.ft. per sec. Sound rock, particularly at the northern bank of the river, was found at much deeper levels than was originally contemplated, with a necessary increase in cost and labor. The first stage length of the masonry dam was 4,200 ft., but the length of foundations actually laid was 5,150 ft. It is estimated that the completed dam will contain nearly thirty million cu.ft., over two-thirds of which has been completed.

In order to pass the required amount back into the river, a number of sluices, 12 ft. x 6 ft. in section have been built in the body of the dam in the southern half of the river bed, at 12 ft. above bed level. This low level

WOMEN WORKING ON THE KRISHNARAJA SAGARA DAM

enables the Mysore Durbar to pass the requisite quantity through no matter how low the lake may be. In addition to these sluices others have been made with the object of passing the water through into the long irrigation channels which are being built to irrigate Mysore lands. Already three large channels have been cut and are now in use. One of the proposed canals is a somewhat large undertaking, for it is proposed to take the canal across the Hulikere-Karighatta range of hills by means of a tunnel nearly two miles long. After crossing the ridge the canal will extend about 70 miles and command a large tract of country.

On the left bank of the river four power lines of 6 ft. diameter have been built in the body of the dam. The head of water available for power generation will vary according to the water level of the reservoir. It is contemplated that in addition to supplying the necessary water for the larger power station at Sivasumudrum, it will be possible to generate a supply at the dam itself, which would be available for the city of Mysore and other places not touched by the larger lines.

There has also been made provision for a large weir which will partly consist of rectangular openings fitted with automatic gates and partly of sluices to be worked by gearing. The spillway will be 1,800 ft. long.

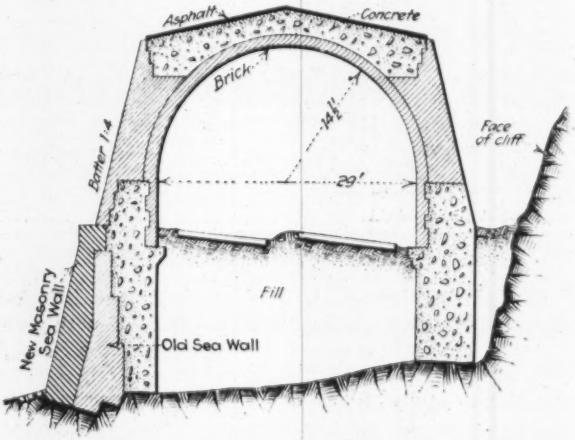
The Krishnaraja Sagara Project compares favorably for size with the other large reservoirs constructed in India. The principal reservoirs already constructed are the Periyar in the Madras Presidency, the Marekanave in the Mysore State, Lake Whiting at Bhatgarh which supplies the Nira Canal in the Bombay Presidency, the Tansa Reservoir which is the principal source of water supply for Bombay and Lake Fife near Poona. The maximum height of the Kaveri Dam will be 143 ft., the corresponding height of the Periyar Dam is 173 ft., of the Marekaneve Dam 167 ft., of Tansa 118 ft. The total capacity of the Krishnaraja Sagara Reservoir will be 41,000 million cu.ft., that of Marekanave 30,145 million cu.ft., and of Periyar 6,185 million cu.ft.

The scheme was conceived many years ago, when the British engineers contemplated some such project but it was left to Sir M. Vishveshvarayya, who came to the state as chief engineer, to have the honor to begin the work. Most of the work has been carried out during the time he has been employed in the state, but he has been ably seconded by Mr. Karpur Srinavasarav, Mr. K. Krishna Iyengar, Mr. B. Subba Roa, Mr. B. Garudaharya and others to whom great credit is due. The labor is exclusively native and many women are engaged in the heavy work, as is shown in one of the views herewith.

Protective Gallery on Tunnel Approach

A PROTECTIVE gallery built as a 440-ft. extension of a double-track tunnel, in order to protect the approach against rocks falling from cliffs, is an unusual piece of work undertaken recently by the Great Western Ry., England, at the Parsons tunnel, near Teignmouth. At this point the line, built along the seashore, is on a fill at the base of a cliff rising 200 ft. above the rails, the fill being faced with a masonry sea wall. Concrete foundation walls for the new work are carried down to rock and extend up to the springing line, the upper portion being faced with brick.

This double-track gallery, conforming to the tunnel section, is 29 ft. wide and 22 ft. high, with a semicircular five-ring brick arch. Concrete is filled in over the crown and haunches, sloping from the center to each side and covered with ¾ in. of asphalt. The exterior faces of the gallery have a batter of 4 to 1, corresponding to that of the sea wall.



COVERED APPROACH TO RAILWAY TUNNEL

In construction, a steel shield 20½ ft. long formed the arch centering, being composed of five ribs shaped to the contour of the arch and having vertical legs seated on timber stringers. Two sets of stringers were used, separated by wedges to provide for adjustment, the lower stringer resting on a concrete base. The ribs were made of double-head rails, laid flat and connected by struts and diagonal braces. Transverse members about 5½ ft. below the crown carried king posts and knee braces and formed a support for gang planks. At the forward end of the shield a working deck was formed level with these planks.

For moving the shield it was supported by jacks while blocking was removed between the stringers and was then lowered about 6 in. onto iron rollers placed on the lower stringer. A wire cable was hitched to chain bridles attached to the posts of the ribs and was operated by a hand winch or hoist. These particulars are taken from an article in the *Engineer*, of London. The work was under the direction of E. G. Matheson, resident engineer, and W. W. Grierson, chief engineer, Great Western Ry.

Ethical and Practical Considerations Regarding the Engineering Corporation

Development Led Naturally to Association with Non-Engineers—Ethical Questions Not Essentially Different from Those Confronting Individual Consultants

FOLLOWING the approval by the Governor of New York of the amended engineers' licensing bill, which permits engineering corporations to practice engineering provided those in charge of the work which constitutes such practice are licensed engineers, Gano Dunn, as the representative of the group which prepared and presented to the Governor the petition favoring the bill, has reported back to each of the individual signers of the petition the action of the Governor. Opportunity is taken at the same time to present to these signers a lengthy brief in defense of the engineering corporation, under the title, "Why Limit the Opportunities of the Professional Engineer?"

The brief points out certain differences between the practice of engineering and of law and medicine, describes the development of the engineering corporation and its advantages to the client and to the profession, and discusses ethical questions which have been brought up in the recent controversy regarding engineering corporations. (Previous discussions of the same subject will be found in *Engineering News-Record* of March 24, 1921, page 518, and April 28, page 724.)

Mr. Dunn's brief is, in part, as follows:

Development of Construction Function

It used to be that "purely professional" engineering was considered limited to the function of design, the preparation of specifications, the negotiating and letting of contracts and judicial supervision.

The execution of design—that is, the function of construction—was let to a "contractor," who in competitive bidding named a unit price or a lump sum for which he would do the work and take the risk. Then, under the oversight of the engineer, who served in a judicial capacity, the contractor would execute the contract at his own expense as cheaply as he honestly could in compliance with the specifications, with the legitimate object of making a maximum profit out of the job.

The engineer represented the client's interest, the contractor represented his own, and once the contract was signed, these interests were strongly opposite. The client paid the engineer a stipulated fee, usually a percentage on the construction cost of executing his designs.

As the engineering field broadened and developed and particularly as it came to involve more of the mechanical, electrical, chemical, and in general the physical sciences, projects took on an increasing complexity during construction, far exceeding that of the earlier days when civil engineering principally covered the field. The work of the contractor as well as the work of the engineer had to broaden and become more scientific and complicated.

The greater complexity of projects and the necessary correlation of all parts made it increasingly difficult to harmonize the separate interests and interrelations of groups and types of contractors on a job, and especially to foresee and fix in advance in the designs and specifications in a manner to stand the strain of oppositeness of interest, all the details that are necessary before work can be let under contract at a lump sum.

In cases where special rapidity was desirable or where the work was extremely difficult so that a contractor would not take the risk without profit that was regarded as inordinate; or where the work involved so little risk it was not considered desirable to pay a contractor's profit on account of the overhead costs it contained; or where there was necessity that the design should be subservient to new conditions that might develop as the work progressed and therefore had better not be determined completely in advance; or where urgency required work to be done while plans were completing; it became the custom for the client to have the engineer not only design the work but carry it out in a manner that was termed "by administration."

This merely meant that instead of letting the work to a contractor with opposite interest, the engineer having the same interest as the client and with the client's funds would for the account of the client, engage engineers, foremen and laborers, purchase materials and plant, and administer, organize, supervise and execute the work as the client's agent.

The client in this case took the risk and the engineer earned for the client what would have been the contractor's profit. The engineer received none of this profit for his extra services and effort, but did receive a larger stipulated fee.

In this way and with the growing demand for the carrying out of work "by administration," engineering offices added to their staffs the engineers and other of the personnel that were formerly employed by the contractor and assumed an increasing number of the contractor's functions, but never his status in relation to the client.

Non-Engineer Associates.—When the engineer did an increasing amount of work "by administration" he found he needed more capital and sometimes would take in a non-engineer partner or associate who would help to supply this capital and who would also perform certain essential but non-engineering parts of the work, such as the function of treasurer, office manager or purchasing agent.

The non-engineer would usually be selected for his commercial instinct and skill in these functions—in other words would be a better business man than the technically trained professional engineer—and the combination of the two types made for strength, economy and increasing satisfaction to the client on account of more successful conservation of his interests.

Enlarging Opportunity for Engineers

The interests of the worker and the owner being unified, the judicial function of the engineer was no longer exercised as to the work as a whole because there was no longer any opposite interest against which to protect the client. It was shifted back to a new point of opposite interest, the relation of the client with the manufacturer or the supplier of material. Thus was the area of the engineer's field enlarged.

The work and responsibility of an engineer grew therefore not only because of the addition of new branches beyond the capacity of an individual to practise but also because of the addition of new functions to engineering activities. With these enlargements in two directions the individual consulting engineer even if he had many employees, was not as much used by clients for certain classes of work as responsible groups of engineers who formed themselves into what has been termed "unrestricted partnerships" or engineering corporations, and who were prepared to assume the responsibility of executing their own designs.

Besides the advantage it offers to the client, the group form whether it be unrestricted partnership or corporation, offers much to engineers, especially to those with their professional careers largely before them. Irrespective of his proficiency, the work of a single consulting engineer is often a feast or a famine because of its greater narrowness of field. The work of the engineering group is steadier—has

a better load factor—on account of the range and diversity of its activities.

In a group the young engineer is given an opportunity for broad experience that he often lacks when associated with an individual engineer and on account of the usually greater magnitude and importance of the projects carried out by the groups, the young engineer has opportunity either to specialize intensively in branches which particularly interest him, or by going from one branch to another to gain a rounded experience.

In this way the engineering groups give opportunity for the development of special aptitudes, for the freer growth of engineers along lines for which they show exceptional talent and serve as schools and opportunities for very high types of engineers who in smaller fields could not reach such effective development.

Function of Non-Engineers.—The non-engineering work of the groups is performed by non-engineers who are as necessary, as expert and almost as much specialized in their lines as the engineers are in theirs. They bring vision and knowledge to bear and perform such non-engineering work better than engineers would perform it.

There are also numerous groups which do not carry out construction. Their work is largely done in the fields of investigating and reporting, including the valuation, planning, operation and management of industrial and utility enterprises.

Their personnel covers a wide range of specialists and, sometimes, of necessity, many non-engineers. The usefulness of these groups is indicated by the importance of the work entrusted to them, which very often is the basis of large financial commitments by banking, industrial or other interests.

If prevented from cooperating in the group form, their effective organization would largely be destroyed.

Combined Counsel

There comes about a very healthy resolve and balance of judgment, which augments the success and the prestige of the engineering profession when engineers call to their aid in the consideration of the financial, commercial and legal, as well as other contacts of engineering, men from these fields to participate in the engineer's group. The client knows that he may put a broad utility or industrial project involving very many branches of engineering into the office of a skilled and competent group with confidence that it will be comprehensively and intelligently carried out, not only in respect to its purely engineering questions but in respect to the relations which these bear to other fields in interested contact with them. In such counsel there is wisdom and safety.

There is no reason why an individual consulting engineer should not—and he in fact often does—perform on a smaller scale all the functions performed by the groups, including the function of construction, but it is not as convenient for him to do it. The other professional engineers of distinction whom he needs for covering the larger fields are not for reasons that have been stated, as ready to enter his employ as they are to work in a larger organization, enter a partnership or become the officers of a corporation. Both the engineers and the non-engineers whom he needs to employ are less confident of their future with him than in a group. He usually can not command the confidence of capital for the larger field to the extent that it is commanded by a group because the group form provides for a certain continuity or succession in the event of death or incapacity, and capital is reluctant to merge itself with the private fortunes of an individual.

The larger projects and the more complicated work tend towards the partnerships and corporations not because they are partnerships and corporations, but because they offer greater facilities and safeguards against failure in such work. Here and not in the form of practise is the deep cause of the contention.

It is acutely recognized by all that engineering can include the function of construction to the dignity and ethics of the engineering profession and to the honor of engineers only when no divided allegiance—no oppositeness of interest—is introduced.

Is there an opposite interest in a percentage fee for construction? For many years, it has been customary for engineers and architects without criticism to accept such fees for design. If there be no oppositeness of interest in accepting a percentage fee of say 6 per cent for design, how can there be an oppositeness of interest or divided allegiance in accepting a percentage fee of say 10 per cent for design and construction?

The sole difference is the quantitative one of greater variety of duties and larger and more valuable service.

Arithmetically, it is true that under a percentage fee an increased cost to the client means a slightly increased fee to the engineer, but if true, it is as true of design as it is of construction and the temptation to earn a larger fee by extravagant construction is no greater than the temptation to earn a larger fee by extravagant design.

While it is arithmetically true that in a percentage fee there is a small element of oppositeness of interest, it is untrue in the total aspect of the relation because the reputation of an engineer is based upon the economy of his results. While if extravagant in design or in construction, he may increase a particular fee to a small extent, his work will not compare favorably with the work of his fellows, and he loses not a part but the whole of the next fee he otherwise would be likely to receive from the client or from other prospective clients who consult that client.

The slight arithmetical oppositeness of interest in a percentage fee is an absolutely different matter from the essential oppositeness of interest of the speculative profit of the contractor which profit consitutes his whole reward.

Engineers who perform both design and construction sometimes style themselves Engineers and Constructors, or Engineers and Contractors, but they do not thereby mean that they execute lump sum contracts under their own designs. This would make them judges of their own performance which would not only be unethical but would show a lack of business sagacity in the client.

The criterion of oppositeness of interest is the infallible test in each case. It is to the honor of the engineering profession that disregard of this criterion is rare, although such disregard when it does occur is not confined to the partnership or corporation forms of practice.

Ethical Questions

Some conceive that under the law "organizations are to be expected in which the engineer shares with his non-engineering associates in the distribution of his purely professional fee, and in addition shares in the bankers, manufacturers or contractors profits flowing from the execution of the work which he initiates, investigates, plans and directs."

Do not such professional engineers as are employed by a consulting engineer share in his purely professional fee, and do not such non-engineers as he employs to do the non-engineering part of his work, also share in his fee, and is this sharing wrong?

If it is not wrong in the office of a consulting engineer, what makes it wrong in the office of a partnership or engineering corporation?

If an engineer in a group should share in manufacturer's or contractor's profits except with the full knowledge and approval of his client, he would be taking pay both ways and violating every principle of honor and ethics. He would be in the same position as the consulting engineer who for a secret commission specified the apparatus of a particular manufacturer or favored a particular contractor in the letting of work. The way to stop the latter fortunately rare abuse, is not to abolish consulting engineers any more than the way to stop the former equally rare abuse, is to abolish corporations and partnerships.

An engineer in a group might own stock in a manufacturing corporation and might thereby be inclined, perhaps unconsciously, to specify the apparatus of that company when it was not for the best interest of his client, but he

would be equally so inclined if he were an individual consulting engineer.

He ought not to own the stock or before engagement, he ought fully to advise the client that he does own it.

An important holding, by a manufacturing or contracting organization, of stock in an engineering corporation might tend towards a favoritism of that organization, perhaps unconsciously by the engineers in the group. If it were not known to the client, it would be unfair to him for he has a right to disinterested service guarded against even unconscious tendencies.

But it is conceivable that the particular manufacturing or contracting organization might be one of such high standing that knowing of the existence of its interest the client would tolerate it and in some cases might even regard it as an advantage; but he should know of it.

The engineer in a group might share in the profits of outside organizations in the indirect way of securing increased practice by their influence in bringing other clients to his group in return for which he might be expected to depart from his position of disinterestedness and favor such outside organizations at the expense of his clients in the placing of purchasing orders or the letting of work.

Bankers' Influence

The group engineer is under no greater temptation to do this than the individual engineer and possibly is under less. The remedy lies as in all questions of this kind, in the character of the individual and in an investigation of records and reputations by clients.

A consulting engineer or a group which enters into secret alliances is sooner or later discovered, isolated and limited in clientele or work, and ultimately pays the penalty for such loss of disinterestedness.

It is charged that there exists the possibility that an engineering group "may have bankers, manufacturers and contractors on its board who may so dominate its policy as to influence its management, including its engineering employees, in the preparation of reports, plans, contracts and specifications, and in the supervision of work, in such a manner as to favor the outside interests of such directors, to the injury of the client."

This arraignment might be made as a possibility against any board of directors, but with the least likelihood of being true of the board of a corporation of professional engineers. Such a board even if it tried would have a hard time accomplishing the self interest of its individuals by the betrayal of the interests of its clients because in engineering matters it can work according to the law only through professional engineers who have a very high standard for the honor of their profession and who, in addition to responsibility to their profession, now have a penal responsibility to the State.

Irrespective of the law the fate of an engineering corporation so misusing the confidence of its clients would be promptly sealed.

High Grade Financial Management

Scrutiny of the directorships of corporations will reveal that because of the professional character of engineering corporations, great care is used in selecting only men of the highest standing whose interest may not even be under suspicion of being adverse to the interests of clients, and clients almost invariably thoroughly investigate these matters. Certain types of interest when represented in an engineering partnership or corporation make for an upholding and conservation of client's interests instead of the reverse.

Within the ranks of an engineering corporation or partnership there is a professional solidarity, partly the result of number and partly the result of esprit de corps, that makes it probably more difficult for the engineer in a group to be coerced or to violate professional ethics than an individual. If one passes from what "may" happen to what does happen, it will be found that an engineer in a group is usually under greater discipline to avoid errors and breaches of ethics than an individual engineer because the directors or the partners know that such breaches wreak in proportion to the responsibility of the organization, disproportionate damage to its reputation and its resources.

Where engineering partnerships and corporations as well as individual engineers have a relation to banking institutions, the sense of professional responsibility is invariably increased rather than diminished. Usually the banker is identified with the client and his incentive is to guard jointly with the engineer the expenditure of the client's funds.

When an engineer is acting as a client's agent with identiy of interest, there is no reason mhy he should not if he chooses, take part of his compensation in the client's securities or invest in them. It would be to the client's interest to have him do so. This applies equally to partnership and corporation practice.

In Conclusion

Analysis and experience both indicate that there are constantly arising in individual as well as in group practice situations that prove the honor and the character of the professional engineer. These must all be tried by the infallible test of identity or oppositeness of interest, and honorable conduct under them depends primarily upon the standards of the individual. For this reason also engineering is in fact as well as in law, a profession.

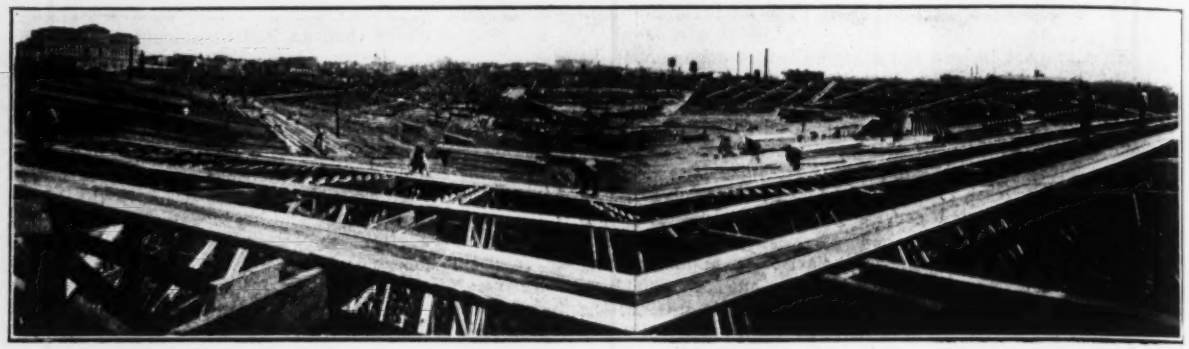
To argue, however, that it must be cast in the same mold as law or medicine, and that it is therefore unethical to perform construction or to practise through partnerships or corporations is absurd, at is is also absurd to call it not a profession but a business because the engineer necessarily works in field of economics and has to associate business men with himself for the best accomplishment of his results.

The engineering profession should preserve equality of opportunity for all—an equal chance to every engineer to win his position in accordance with his character, ability and efforts.

To limit the broadening of his field by restriction of group association would be detrimental to public interests and necessities, would prevent the development of the best that is in him and would narrow the future of large numbers of ambitious men who have chosen the profession of engineering as their life calling.

Mortar Tests in Brick Piers

Tests of a series of 8 x 8-in. brick piers, built up some of face brick and some of common brick, with various mixtures of cement and lime mortar ranging from straight 1:3 cement-sand to a 1:3 lime-sand mix, were carried out some time ago by Prof. J. S. Macgregor of Columbia University for the National Lime Association. Their results are summarized in a pamphlet (Bulletin 300) just issued by the association, and some interesting facts are shown. Both the face brick and the common brick piers showed higher strengths with mortars containing some lime than with straight cement mortar, the highest strength (by about 30 per cent increase) being shown by mixtures containing 15 to 25 per cent of lime. In the case of the face brick piers, moreover, the modulus of elasticity was higher for the piers laid up in part time mortar than for the cement-mortar piers, while with common brick the cement-mortar piers showed the higher values by a slight margin. Prof. Macgregor explains the result by the more perfect bedding secured with the lime-mixed mortar on account of its higher plasticity, and by the decrease of the "suction" effect of the brick on the mortar.



STADIUM UNDER CONSTRUCTION
Photograph taken June 4, twenty-nine days after work started

Building the Jersey City Prize-Fight Stadium

Materials Delivery Essential Feature—Octagonal Structure Covers Eight Acres and Contains 2,000,000 Ft. B.M. of Lumber

IN THE construction of the timber stadium at Jersey City, in which the Dempsey-Carpentier championship prize fight is to be held on July 2, the contractors had but two months in which to prepare the site and finish the structure. The time element was, therefore the prime consideration and affected not only construction methods but materials delivery. The structure is situated on what was an ash dump, and about 60,000 cu.yd. of material were moved before the site could be made available for construction. The first steam shovel began operating on April 28, two days after the contractors were told to start work, and actual construction of the stadium began May 6. Four steam shovels operated in the interim to make the site ready for construction.

The structure is octagonal in shape, the base of each of the triangles forming the octagon being 256 ft. in length with an altitude of 300 ft. The stadium rises from the ground level at the ring center to a height of 34 ft. at the circumference. It is estimated that the seating capacity is from 60,000 to 80,000.

The stadium is of simple design, essential parts being vertical supporting posts resting on timber sills, diagonal, lateral and longitudinal bracing, floor joists and flooring. Vertical supporting posts are generally of 6 x 6-in. timbers with the exception of the outer four rows, which are of 8 x 8-in. material. These timbers are carried on 4 x 4-ft. sills of 2 x 10 and 2 x 12-in. planks laid in two or three courses. Bracing is of 1½ x 5-in. stuff. Longitudinal bracing connects vertical posts at the sills and directly beneath floor joists, and for the outer third of the distance from the center of the ring additional bracing is put in at approximate vertical intervals of 10 ft. Posts are braced laterally at the sills and by diagonals that connect each pair of posts.

FIG. 2. SILLS FOR TWO SECTIONS BEING SET

The ring is 24 ft. square and elevated about 4 ft. From the center of the ring out along the altitude of any triangle a distance of 138½ ft. the stadium is entirely floored over, accommodating about 12,000 ringside seats and a row of boxes 10½ ft. wide. Behind

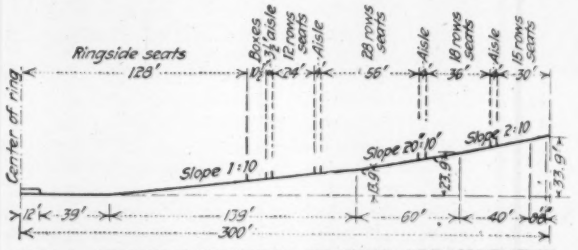


FIG. 1. PROFILE, SHOWING SEATING ARRANGEMENT

the boxes is a 3½-ft. aisle and then come successively bench-seat sections 24 ft., 56 ft., 36 ft., and 30 ft. in width, separated by 4-ft. aisles. In these four sections the 2 x 12-in. floor planks are not laid continuous but on 24-in. centers, and the bench seats, elevated about 14 in., occupy these spaces between floor planks. Though not included in the original plans, 4 x 4-in. timbers are used to stiffen the floor, being laid midway between floor joists. The 2 x 12-in. floor joists are nailed on either side of vertical posts, and so arranged that the joints come on alternate posts.

The vertical posts are set on 10-ft. centers in a direction perpendicular to the base of a triangular section and on 8-ft. centers in a direction parallel to the base. The center lines of sills therefore are perpendicular and parallel, respectively, to the base of a triangular section.

Three pitches are found in the profile of the stadium, the breaks coming 51 ft., 190 ft. and 250 ft. from the center of the ring. The first 51 ft. are level. The pitch in the first section is 1 ft. in 10; in the second

section 20 in. in 10 ft.; and in the third 2 ft. in 10 ft. A vertical section through one of the triangles along the line of its altitude is shown in Fig. 1.

Triangular sections were erected independently and then joined. Lumber was cut on the job by three power-driven saws located in convenient points. All the sills for one, or at times two, sections, were put in before any framing was done. Because of the uniformity of sizes of timbers used it was possible to carry on mass methods of cutting, framing and erecting. Lumber for main framing was scattered in place before any erecting began. An average of 450 men with a

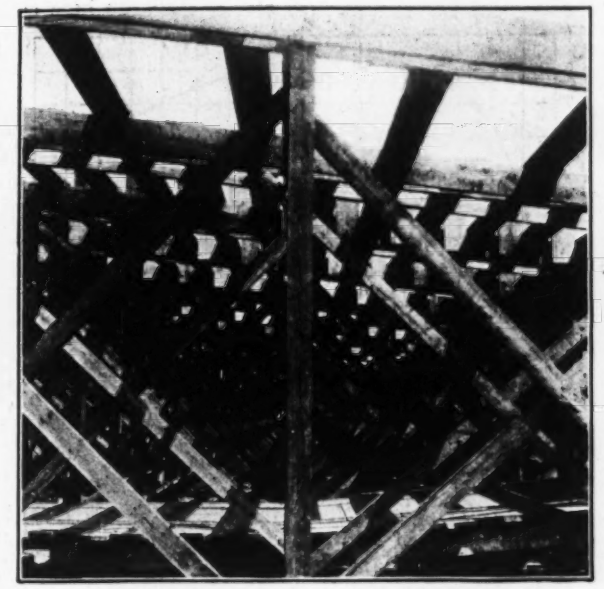


FIG. 3. LATERAL BRACING AT APPROXIMATE CENTER OF STADIUM, AND ENTRANCE RAMP

peak of 600, most of them carpenters and carpenters' helpers, were employed in building the structure.

When the contractors received the orders to start the construction they not only had to make available the site but also had to bring to the site from near-by streets water for fire protection. Although a street ran through the site (and for the use of this a temporary vacating order was granted by the Jersey City municipal authorities), the street carried no water mains. Both an 8-in. and 12-in. main were therefore laid and hydrants were installed in the structure itself.

As a limited time was given in which to build the stadium the procurement of lumber was the first chief concern of the contractors. Some eighty-odd bids were received for furnishing the lumber but all but one were contingent upon outside delivery. The Coastwise Lumber Co., Brooklyn, was given the contract for furnishing the lumber, it having practically all necessary lumber in stock. All of this lumber was carried from Brooklyn to the stadium in motor trucks. A fleet of forty trucks was kept busy part of the time.

Entrance and exit ramps are provided in alternate triangular sections for ringside and box seats only. Ramps in series of three are placed in the center of other sections to care for above ringside and box seats.

It is estimated that the structure cost approximately $250,000, of which amount the lumber cost is little less than a third. The stadium is not permanent and cannot stand longer than six months, the life of the permit and the street vacation order. It is estimated that the lumber will have a salvage value of around $30,000.

The work is being done by C. S. and J. W. Edwards, of Jersey City, with P. H. Smith as general superintendent. A. J. O'Brien is the engineer in charge for Tex Rickard, the promoter of the fight.

Work of the Swiss Bridge-Builders' Structural Research Board

RESEARCH in the field of bridge and structural problems has been under way in Switzerland for the past four years, but little has been heard of the work in America. It was initiated in May, 1917, by the action of the Swiss Bridge Builders and Structural Fabricators' Association in organizing a research board or study committee. Subsequently the Swiss I-Beam Association and two individual works joined the undertaking. M. Ross, secretary of the board, states that bi-monthly meetings have been held during the past three years, during which period a working plan has been developed, tests outlined and assigned to committees, and several elaborate experimental investigations carried out.

Seven sub-committees have been organized to carry out the investigations and report upon them to the board. Their subjects are as follows: (1) Stresses and load distribution in bridge floors; (2) buckling strength of top chords of pony truss and girder bridges; (3) impact of falling loads upon steel structures; (4) instruments for field tests; (5) secondary stresses; (6) laboratory investigations; (7) standards for single-track railway bridges, and standards for structural parts. The laboratory investigations, in charge of Committee 6, include such subjects as the buckling strength of compression flanges of beams, the strength of eccentrically loaded columns, stress distribution in splices, strength of built-up columns with varying quality of metal, stress transmission through rivet lines, load distribution bearings.

Secondary-stress measurements were made on the railway bridge over the Rhone, near Brig, in 1917. This investigation included about 6,000 separate strain measurements; analysis of the data has been completed within the past year. In 1918 a still more elaborate series of tests was carried out on a bridge of the Lötschberg Ry. over the Suldbach, using a specially provided 25-ton concentrated load. This investigation included some 45,000 measurements of strains, deflections, and inclinations, bearing on the questions of committees 1, 2 and 5. These results also should be published shortly. Additional measurements of secondary stresses on four other bridges are in contemplation. Drop tests with a 1,000-lb. load have also been carried out, and further tests are to be made to determine the distribution of distortion and the speed of propagation of the dynamic impulse.

Some experimental work carried out by the Swiss Federal Rys. is also to be studied by the board, although carried out independently. Its most important item is a series of running tests of steam and electric locomotives over bridges, made in 1918, whose object was to reveal the difference in dynamic effect of the two types of locomotives and fixed critical speeds. Another item is laboratory work done for the Federal Rys. at the Federal Testing Institute in Zürich on the strength of various types of stringer connections.

New Method of Determining Efficiency of Centrifugal Pumps

By Allen F. Sherzer
Assistant Professor of Mechanical Engineering, University of Michigan, Ann Arbor

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ENGINEERS are not infrequently faced with the necessity of estimating the probable efficiency of a given centrifugal pump under various conditions of operation. To meet this need I have developed what I believe to be a new method for predicting, at a glance, the probable efficiency of a centrifugal pump when the conditions of service are known or may be assumed.

The efficiency of a centrifugal pump is a function of the speed, head developed, and quantity discharged, the latter being by far the most important. Generally speaking, the maximum efficiency of a given pump will increase as the speed increases up to a certain point when a further increase in speed will cause a decrease in efficiency. Within a reasonable change of speed the efficiency is, however, but slightly affected.

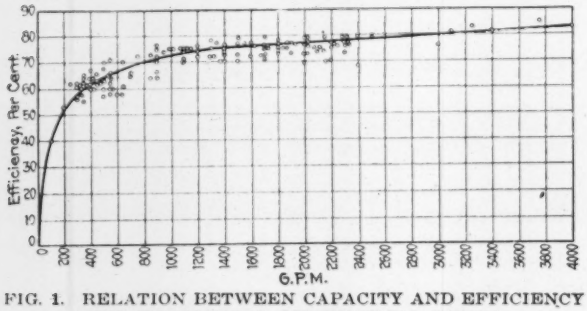


FIG. 1. RELATION BETWEEN CAPACITY AND EFFICIENCY FOR HORIZONTAL CENTRIFUGAL PUMPS

The higher the head against which a pump discharges within certain limits for a given capacity, the higher the efficiency will be likely to be. This is due largely to the fact that as the head is increased for a given discharge the water horsepower output of the pump is correspondingly increased. The mechanical losses do not increase at quite the same rate and hence they form a smaller per cent of the total power required to pump, which results in an improvement in the efficiency.

The quantity of water for which the pump is to be designed has by far the greatest effect on its efficiency. This is true to such an extent that the efficiency is sometimes expressed as a function of capacity to the exclusion of all the other factors. The relation between capacity and efficiency is shown by Fig. 1. The data from which this curve was constructed were obtained from the test results of many experiments on various sizes and types of pumps, together with such other material as was available to the writer. It should be clearly understood that the values given by this curve are merely averages and that any given pump is as likely to give results above as below those of the curves. It is believed that they closely represent average practice and furnish a very reliable means of estimating the maximum efficiency which might be expected of a pump designed to handle any given amount of water.

These and all other curves in this article refer to the single-stage double-suction volute type of pump only, although similar curves could easily be constructed for any other type, either single or multi-stage.

Any method of estimating efficiency of pumps based on the discharge alone is rather incomplete since other elements must be considered. To meet this need another criterion has been established to include the combined effect of all the variables. This is known as the constant of specific speed, sometimes referred to as N_s in pump literature. This constant classifies a pump as to its type and includes the effect of each of the variables. It has a parallel in water turbine literature known as either the type characteristic K_t or as the specific speed N_s and serves about the same purpose in classifying centrifugal pumps. The derivation of this constant N_s will not be taken up here as

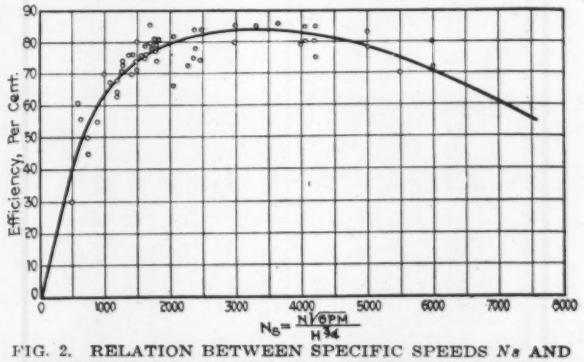


FIG. 2. RELATION BETWEEN SPECIFIC SPEEDS N_s AND EFFICIENCY FOR HORIZONTAL CENTRIFUGAL PUMPS

it may be found in most texts on this subject, but its value will be defined as follows: $N_s = (R.P.M. \times \sqrt{GPM})/H^{3/4}$ where N_s = the specific speed; GPM = the discharge of the pump for maximum efficiency; H = the head for maximum efficiency.

It is rather doubtful if the physical significance of this value of N_s is of any importance although it can be shown to be the speed in r.p.m. at which the pump would revolve when discharging 1 gal. per min. against a head of 1 ft.

The curve (Fig. 2) shows the relation between specific speed N_s and efficiency for various centrifugal pumps. These data, as before, were taken from my own practice and from such other tests as were available.

The usual range of pumps have values of N_s from 500 up to about 5,000 although these are not necessarily the limits. As will be seen from the curve, the efficiency increases quite rapidly with the specific speed until it reaches a maximum when N_s equals about 3,000, after which it falls off slowly. The reason for this is that in order to construct pumps of extremely high specific speed it is necessary to decrease the outer diameter of the impeller to increase the r.p.m. for a given head. This somewhat shortens the vanes and prevents proper guidance of the water in its flow through the impeller—which increases the hydraulic losses and reduces the efficiency.

Fig. 2 shows that the efficiency may be high over quite a range of specific speed and that in general there are two values of N_s corresponding to a given efficiency.

While the curves indicate that for a specific speed of 3,000 an efficiency of somewhat over 80 per cent might be expected, in practice this efficiency would be obtained only if the capacity were favorable, as indicated by the curve in Fig. 1. The value of N_s alone is not sufficient to absolutely fix the value of the efficiency, as

we are able to design a pump of a specific speed of 3,000 for a wide range of capacities each of which will have its effect also on the ultimate efficiency.

A pump which delivers a small quantity of water under high heads at low rotative speeds is classified as a low specific speed runner and is recognized in practice by the large ratio of the inlet diameter to the outer diameter of the impeller, and also, to a certain extent, by the narrow width of the runner.

A runner with its outer diameter but little greater than its inlet diameter and having wide water passages is usually classified as a high-speed runner. Such runners deliver a comparatively large volume of water against a relatively low head when driven at relatively high speeds. Between these two classes there are many intermediate types which may easily be classified according to the value of N_s.

It should be understood that in computing the value of N_s the discharge and head corresponding to maximum efficiency at a given speed should be selected for use in the formula $N = (R.P.M. \times \sqrt{GPM})/H^{\frac{3}{4}}$, as otherwise the value of N_s would have little or no meaning, there being an infinite number of values from which to select for any given pump.

A Composite Curve

Since neither curve 1 or 2 is alone sufficient to definitely fix the probable efficiency of a given pump designed for certain assumed conditions the possibility of combining these two into a composite curve was carefully considered. This resulted in the diagram, Fig. 3, in which lines of equal efficiency are plotted on G.P.M. as abscissa and values of N_s as ordinates. The lines of equal efficiency join to form a rectangle of equal efficiency. In other words, all points within the rectangle of equal efficiency are equal to or above the efficiency marked on the line enclosing them. By drawing a suitable number of these equal efficiency lines intermediate values may be readily interpolated with sufficient accuracy.

Reference to Fig. 1 shows that the curve crosses the 75 per cent efficiency line at a discharge of about 1,400 G.P.M., and that for all discharges greater than 1,400 G.P.M., an efficiency of 75 per cent or over may be expected under favorable values of N_s. This fixes the left hand limit of the 75 per cent efficiency rectangle as shown by Fig. 3. Turning to Fig. 2, we see that the curve intersects the 75 per cent efficiency line at values of N_s of about 1,550 and 5,450. These values, when transferred to Fig. 3, form the lower and upper limits of the 75 per cent efficiency rectangle and all values of G.P.M. and N_s lying in this rectangle will show efficiencies of 75 per cent or more. In the same way the lines of equal efficiency for 76, 77 and 78 per cent and others may be constructed.

To make use of the diagram, Fig. 3, it is necessary to know the conditions of head, discharge and speed under which the pump is to operate. Having these data, compute the value of N_s. Using this value of N_s as ordinate, and with the discharge as abscissa, locate the point on the diagram in Fig. 3. In case this does not fall exactly on any of the lines shown, interpolate horizontally and vertically, which will give the probable efficiency with sufficient accuracy for all usual purposes.

An example may help to make this clear. Assume that a centrifugal pump is to be designed for a discharge of 600 G.P.M. against a total head of 120 ft. when operating at a constant speed of 1,750 r.p.m., and that it is desired to estimate its probable maximum efficiency.

We first find that the value of $N_s = 1{,}750 \sqrt{600} / 120^{\frac{3}{4}} = 1{,}185$. Now turning to Fig. 3 and traveling up the 600 G.P.M. line till we come to $N_s = 1{,}185$ we find that the point lies at the lower left hand corner of the 65 per cent rectangle and that its probable efficiency would be about 65 per cent or perhaps a little more. This value agrees quite satisfactorily with practical experience, but when used for power estimating purposes it should be reduced a little for safety, as it frequently happens that the power required to drive the pump at its point of maximum efficiency is somewhat exceeded when discharging a greater quantity of water aganst a lower head, which may easily take place in any given installation. The accuracy of this method is necessarily limited by the accuracy of the data on which it is based but as such were selected

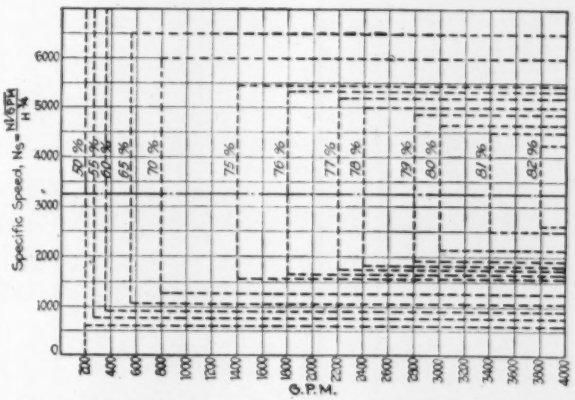


FIG. 3. EFFICIENCY CONTOURS FOR CENTRIFUGAL PUMPS IN TERMS OF GALLONS PER MINUTE AND SPECIFIC SPEEDS

from various sources and include the results of tests on a great number of pumps it is believed that it is at least representative of average practice. The method given in this paper may be readily applied to any type of pump and can be modified if necessary to accord with the experience of any who may care to make use of it.

Its use in connection with extremely high or extremely low values of N_s is open to question, as under these conditions the values from tests are not very consistent and it might prove misleading. In any event it might serve as a valuable guide in the absence of more specific information concerning any proposed design.

Increase in Irrigated Area Served by Pumps

The rapid increase in area irrigated with water supplied by pumps in the San Joaquin Valley of California is shown by a recent statement of the San Joaquin Light & Power Corporation. In the thirty-day period ending March 22 this company added to its system services for supplying 24,858 acres of land to be irrigated by water from electrically-driven pumps. This brings the total area for which pumping services have been installed by this company since the first of last November up to 84,224 acres. The capacity of motors installed to supply this service totals 23,808 horsepower.

Testing-Cylinders for Illinois Experimental Road

By H F. Clemmer
Testing Engineer, Division of Highways, Springfield, Ill.

DETERMINATION of subgrade movement, moisture content and bearing power, will be accomplished on the Bates experimental road in Illinois, by means of the testing cylinders shown by the accompanying illustrations. Fig. 1 shows the component parts and Fig. 2 shows the apparatus assembled.

Briefly described, the subgrade testing cylinder, as it has been named, consists of a 1½ x 1¼-in. black iron reducer *A;* a short length of 1¼-in. black iron pipe *B;* a 1½-in. counter-sunk black iron plug *C*; a special ¼ x 1¼-in. brass bearing plug *D*, a short sleeve of 1-in. black iron pipe *E*, and a ½ x 1¼-in. brass disk *F*. Plug

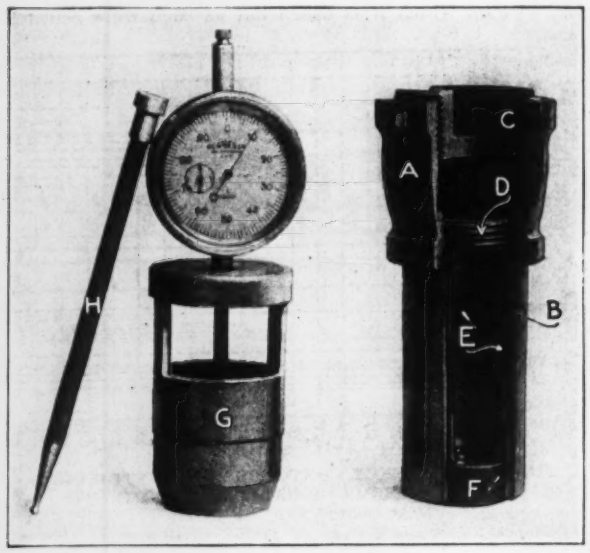


FIG. 1. COMPONENT PARTS OF SUBGRADE TESTING CYLINDER

C is flush with the top of the pavement and plug *D* rests freely on the subgrade. The lengths of the pipe *B* and the sleeve *E* vary with the thickness of the pavement in which the cylinders are used. The device for reading the change in position of the bearing plug in relation to the pavement consists of an Ames dial fastened in a support *G*, which rests on the stationary brass disk *D*, and of a rod *H*, which fits into a small circular depression in the center of the bearing plug *F*.

When it is desired to install testing cylinders in a concrete pavement, at the time of the construction of the pavement, wooden cylinders 3-in. in diameter and above ½-in. less in length than the thickness of the pavement are set in place before the concrete is poured. After the tamping and finishing of the surface have been completed, the testing cylinders are substituted for the wood plugs, with their tops flush with the top of the pavement. The installation of these cylinders in bituminous concrete and brick pavements can be effected, with the use of the Calyx core drill, after completion of the pavement. Considerable care must be exercised when grouting around the cylinders to secure proper contact with the adjacent pavement.

The brass bearing plug *D* follows the downward

FIG. 2. TESTING CYLINDER ASSEMBLED

movement of the pavement and the upward movement of the subgrade so that any separation between the subgrade and the bottom of the pavement can be learned by measurements taken from this plug. The difference between initial readings taken as soon as possible after the testing cylinders are placed and readings taken at subsequent times show any change in position between the subgrade and the pavement.

These bearing plugs can also be used to obtain data on the bearing power of the subgrade by loading them with the plunger of the static bearing power determinator. By removing the brass bearing plug and iron sleeve, they afford an excellent means of obtaining subgrade samples for moisture content determinations. Also the brass bearing plugs in the cylinders give excellent points for securing precise levels so that the amount of heaving or settling of the pavement can be determined.

The testing cylinders are set in rows of three and five across the pavement, the rows being 25 ft. apart. When five cylinders are set in a row they are spaced in the center, at the quarter points and 18 in. from the edges.

Filings on California Water Powers

A TOTAL of 107 applications for permits to develop hydro-electric power are now on file with the California State Water Commission. These applications cover 6,802,000 theoretical horsepower whose development is estimated to cost $693,498,000, according to Charles H. Lee, president of the commission.

"The companies now engaged in the production of hydro-electric energy," Mr. Lee states, "are planning to spend this vast sum of money to supply California industries with much-needed power which can be obtained through no other medium inasmuch as the other natural resources within the state, such as oil, gasoline and natural gas, already are carrying their maximum load and cannot be depended upon to furnish additional power in the future. California's power problems can be solved only by the more intensive development of the latent powers in her rivers and mountain streams, and it is in this direction that the hydro-electric companies are turning."

River:	Number of Important Plants	Theoretical Horsepower	Cost of Development
American	4	194,000	$9,570,000
Feather	8	723,000	86,500,000
Kern	7	347,000	31,620,000
Kings	11	906,000	107,500,000
Klamath	6	499,000	38,300,000
Merced	4	211,000	19,430,000
Mokelumne	3	39,000	1,940,000
Owens	8	164,000	14,508,000
Sacramento (and upper tributaries, including Pit River)	15	871,000	86,900,000
San Joaquin	14	1,803,000	204,000,000
Stanislaus	4	121,000	4,160,000
Tuolumne	13	614,000	58,370,000
Yuba	10	310,000	30,700,000
Total	107	6,802,000	$693,498,000

The following table was prepared by the commission to show the watersheds involved in the filings.

Findings of Los Angeles Sewage Disposal Commission

A BRIEF summary of the preliminary report of the Special Sewage Disposal Commission of Los Angeles, Cal., was printed in *Engineering News-Record*, May 5, p. 784. In more detail the commission, the members of which were George W. Fuller, New York City, Prof. George C. Whipple, Cambridge, Mass., and William Mulholland, Los Angeles, summarized their findings, conclusions and recommendations substantially as follows:

The discharge of the Los Angeles sewage into the ocean at Hyperion is now causing a nuisance along the beach for more than a mile in either direction from the outlet. Other cities along the coast also discharge into the ocean the flow from their sewer outlets under such conditions, in some instances, as to cause objectionable results, thus pointing to a general need for improving the conditions along the coast in the interests of health and cleanliness. The present dispersion facilities at Hyperion for mixing the sewage with an adequate portion of ocean water are much inferior to modern arrangements at other large cities.

The sewage flow averages about 35 m.g.d. but at intervals approximates the rate of 55 m.g.d., which approaches the safe capacity of the present outfall sewer. This is shown by the fact that in some portions of the outfall sewer there is at times an overflow from the manholes.

Strong Sewage High in Grease

The analysis of Los Angeles sewage, which averages about 55 gal. daily per person connected with the sewers, shows it to be stronger than that found at most cities where the waste water is removed in sewers separate from storm drains. Its content in grease, mineral oil and dissolved mineral matter coming from the ground water is particularly high. In each day's sewage there are 198 lb. of suspended matter, 24 lb. of nitrogen, 70 lb. of grease, and 6.5 lb. of mineral oils per 1,000 population. Of the total suspended matter 3 per cent is organic nitrogen and 3 per cent is mineral oil. Bacterial action in the sewage as it flows through the long outfall sewer forms decomposition gases which are injuring the existing masonry above the flow line.

The demand for irrigation water in the Los Angeles district is such that the amount used during the three summer months approximates the capacity of the Owens River Aqueduct (400 sec.-ft.) but during the three winter months the demand falls to less than 20 sec.-ft. During the spring and fall months the demand ranges from 20 to 150 sec.-ft., depending on rainfall. This water is available for distribution through existing pipes from an elevation of 1,450 ft. above sea level. For half the year water from the hydro-electric plants on the Owens River Aqueduct to the extent of about 200 sec.-ft. is wasted in the Los Angeles River because of lack of irrigation demand.

Although the ground water levels are said to be falling there is as yet no serious depletion of the ground water level in the Los Angeles district, where individual ranchers in many instances secure irrigation water by means of their own pumping plants. There is some demand for an additional supply of irrigation water outside of the immediate Los Angeles district, but the city would require further legislation to deliver purified sewage to such localities and would have to develop a system of pumping and distribution works.

Sewage Irrigation Feasible Only Half the Year

In the event that purified sewage is used for irrigation it would be necessary to get rid of it by some other method than land disposal for more than half of the year. Suitable locations for building reservoirs in which to store the purified sewage during the rainy periods for use during dry weather do not exist in this locality. The discharge of surplus water from Owens River into the Los Angeles River is causing complaints from property owners in the lower valley on account of drainage conditions. A depletion of the ground water level in the future should it occur, would, of course, lead to a lessening of this complication and the discharge of purified sewage into the river gravels might be a benefit.

The fertilizer demand in the Los Angeles market might provide a market for the sewage sludge produced by treating the sewage, but, according to available analyses, the sewage contains so much grease and mineral oil that the commercial success of a sludge utilization project would be uncertain.

We conclude that the Los Angeles sewage, after it has been fine-screened, can be dispersed in the ocean without nuisance for many years to come through a modern arrangement of deep multiple outlets designed to bring about a thorough mixing of the sewage with the sea water. With the growth of the city and larger volume of sewage, and with an increased use of the beach for bathing and recreation purposes, the dispersion arrangements will require extension from time to time. Chlorination of the screened sewage may be required at intervals in later years. It is essential that a new ocean outfall be constructed as soon as possible. Even if the sewage of the city should be used for irrigation, the new outfall sewer would be required, for reasons above mentioned. The new outfall should be of sufficient capacity to serve, in conjunction with the existing outfall, the area tributary to it when this area is completely built up, namely for a population of about 2,500,000. A total capacity of 270 m.g.d. will afford reasonable provision for future commercial and industrial developments. A systematic program should be adopted for preventing the entrance into the sewers of substances which will injure the structures or which will needlessly complicate the treatment of the sewage for irrigation or fertilizer purposes.

Availability and Cost of Activated-Sludge Process

The activated-sludge method of sewage treatment is the most advantageous one to consider in preparing the Los Angeles sewage for irrigation and the sewage solids for use as a fertilizer. There are no precedents either in this country or Europe to show definitely just what would be the best detailed arrangement for Los Angeles to adopt for utilizing the irrigation and fertilizing properties of its sewage. Milwaukee has conducted investigations for over seven years and has developed many advances in the art, but has not yet begun to install its permanent treatment plant. Houston is now installing presses and driers for preparing as a fertilizer the sludge from a plant which was built four years ago. Los Angeles should adopt a systematic and orderly program for demonstrating the best arrangements for treating the local sewage and utilizing its irrigating and fertilizing properties.

In designing the new outfall sewer and its principal branches, due regard should be given to facilities for delivering the sewage to suitable locations where treatment plants can be built for operation during a part or all of the year, depending upon experiences to be developed later.

From the best available information the activated-sludge process at Los Angeles would involve: (1) An investment of about $60,000 per 1,000,000 gal. of daily capacity, exclusive of the cost of land and arrangements for delivering sewage to and from the plant. (2) Operating costs (exclusive of preparing the sludge for use as a fertilizer) amounting to $6 to $14 per 1,000,000 gal., depending upon the size of plant and cost of power, a probable figure for a large plant being about $10. (3) Operating costs for pressing and drying the sludge, ranging from $10 to $20 per ton of fertilizer, a probable average figure being about $15. (4) Possible operating cost for degreasing.

From the best information now available the activated-sludge process at Los Angeles would produce about 1.5 tons of fertilizer (dry basis) per 1,000,000 gal. of sewage treated. This would contain about 4 per cent (units) of organic nitrogen, as compared with 3 per cent in the untreated sludge. On the assumption that purified sewage has the same market value for irrigating purposes as the present charge for Owens River water ($6 per acre-foot) this would

be $18.50 per 1,000,000 gal. If used at considerable distances from and elevations above the treatment plant, its value might be more than this, but the cost of delivering it would have to be taken into account. The sales would be limited to the irrigating season as before mentioned. The purified sewage would contain some nitrate, and this would have a fertilizer value, but there is no adequate basis for estimating what this would be. The value of the dry fertilizer in sacks at the plant would be about $4.50 per unit, or $18 per ton, provided the quantity of grease and mineral oil is not too high for successful use. If too high, the cost of degreasing would become an operating expense. In view of the foregoing evidence it is doubtful whether net proceeds would result from the activated-sludge process at Los Angeles at the present time; but future conditions may make its application much more favorable than now.

RECOMMENDATIONS

We recommend: (1) That all reasonable steps be taken to exclude from the sewers all substances which can be otherwise disposed of and which, if discharged into the sewers, would complicate the utilization of the sewage for irrigation, and more particularly, as a fertilizer. (2) That a new ocean outfall be constructed of a capacity of at least 210 m.g.d. (3) That a plant for the fine screening of the sewage be installed. (4) That arrangements be provided for dispersing the screened sewage at Hyperion by means of deep multiple outlets. (5) That the outfall sewer be built in such a manner as to resist disintegration from sewer gases, so far as this is practicable. (6) That an activated-sludge plant having a capacity of at least 2.5 m.g.d. should be built at once in order to carry out the investigation referred to above. This plant should be so arranged that additional units may be advantageously installed in the future if desirable or necessary. (7) That the proposed bond issue be increased from $12,850,000 to $14,000,000 in order to provide for improved deep multiple outlets at Hyperion, to insure the outfall sewer being of acid-resisting construction as far as practicable, and to enable a start to be made at once on sewage purification and utilization.

Road Experiment with Concrete Slabs

The borough engineer of Taunton, Somerset, England, has recently been experimenting with concrete slabs for road construction. The slabs used were 3 ft. 6 in. long by 2 ft. wide by 5 in. thick, with smaller slabs to break the joint. Some of the slabs were reinforced and others not. As a test, these slabs were laid to cover a length of 20 ft. of the main highway of Taunton, where a considerable amount of traffic passes. The length of highway was excavated and a foundation of sand and cement in the proportion of 6:1 laid. The slabs were laid on this with ½-in. joints left open and subsequently finished with a pitch and tar filling. The cost worked out at £1.1.9 per square yard. The object of the experiment was to minimize traffic obstruction and to facilitate the repair to the city's sewers. These slabs have been in for three months, are wearing well and, so far, show no sign of working loose on the bed.

Maintenance of Paving by Street Railway Companies

Distribution of Maintenance Cost—Headers Isolate Track Strip from Street at Toledo—Removable Special Sections

BY A. SWARTZ
Superintendent of Transportation, Community Traction Co., Toledo, Ohio

WHEN street railways were operated by animal power the traffic had a tendency to wear the railway strip of paving, but with operation by electric power it does not seem that any such wear can be attributed directly to the method of propulsion. Arguments against relieving street railway companies from the responsibility of construction and maintenance of the paving between and just outside their tracks are given in *Engineering News-Record* of Oct. 21, 1920, p. 795, but these arguments appear to be in many ways unfair toward the railways. As street railways are necessary it devolves upon the city to grant them the right to use the streets. The railway and the public have mutual interests.

After the original pavement is laid, the greatest share of its renewal is chargeable to the city as a whole, rather than to the contiguous property owners. Since the city as a whole pays for and receives the benefit of this renewal, why should the street railway be further hampered by additional cost of paving renewals outside its own track strip? On the contrary, it would seem that after the railway company has once paid for its original pavement the city should stand its share of the renewal of the track strip, as this would reduce the cost of operation to the railway and would lessen the cost of a ride.

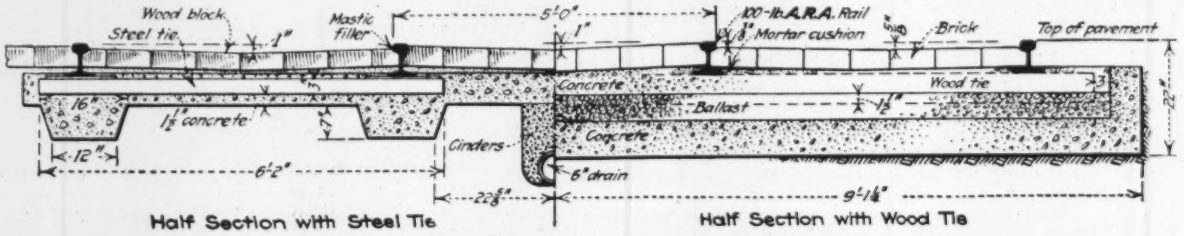


FIG. 1. STREET RAILWAY TRACK CONSTRUCTION AT TOLEDO

Drainage of pavements where there are railroad tracks is not much more difficult than that of other pavements and the contour of the streets need not be altered materially to take care of the drainage. If the subgrade is poor, a tile drain can be laid. With a concrete foundation, water seeping through the pavement may be taken care of by track drains placed at street intersections and connected with the sewer inlets.

Track construction does not necessarily affect maintenance of paving outside of the track strip, even if the track is light and flexible. As to additional cost for heavy track construction, Mr. Capes presents arguments to the effect that the community should not be required to stand such cost, but that they should be borne by the street railways and the people who use them. My feeling is that the entire community is benefited in proportion to the efficiency of the transportation system, and should share in its expenses.

In Toledo we have a type of street railway track con-

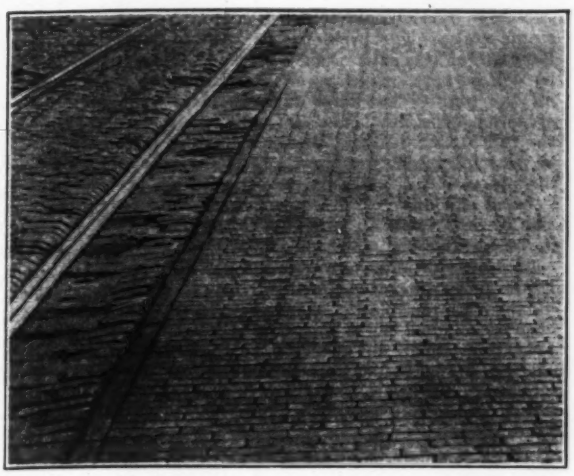


FIG. 2. PAVING OUTSIDE HEADER NOT DISTURBED BY TRACK VIBRATION

struction which counteracts some of the objections raised in the article mentioned above. This construction is shown in Fig. 1. A 6- to 8-in. concrete foundation is laid on a subgrade which is drained by tile wherever necessary. On the concrete is a 2-in. cushion of crushed stone ballast, this ballast being carried up to within 3 or 4 in. of the top of the tie. Above the ballast is another layer of concrete, about 5 in. thick, to support the paving, which is of brick or creosoted wood block. Recently we have floated the surface of the top layer of concrete to a smooth finish, covering this with a coat of pitch to make the concrete as impervious as possible and laying the wood block upon this coating. Drainage in each track strip is provided by drains at street intersections, connected with the sewer inlets. Where steel ties are used they are embedded in the concrete, making a monolithic concrete structure from the bottom of the paving block to the top of the subgrade, as the crushed stone cushion is omitted.

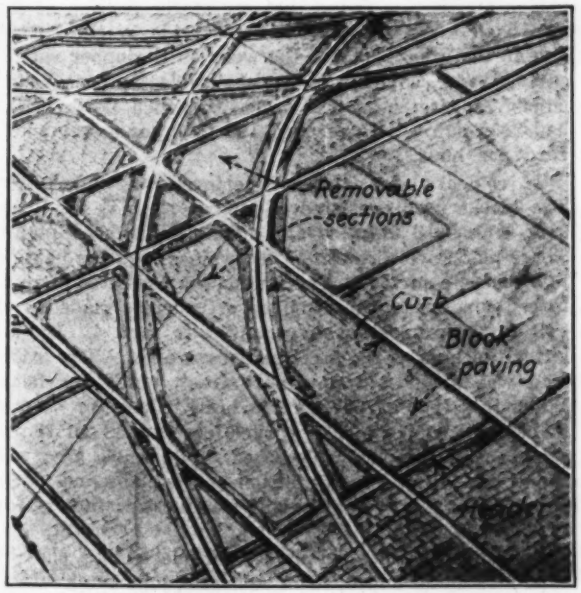


FIG. 3. TRACK INTERSECTION PAVED WITH REMOVABLE SECTIONS

The main point is that we have constructed our track strip in such a manner that it is entirely separated from that portion of the paving outside of the railway tracks which is paid for and maintained by the city. This is done by a creosoted wood-block header about 12 in. deep and 4 in. wide, laid at the outside edge of the track strip and acting as a curb for the city portion of the paving. With this construction there can be little vibration in the city's portion of the paving due to traffic over the railway strip. Fig. 4 shows the laying of the header and Fig. 2 shows a street with paving in poor condition along the tracks but in good condition outside of the header.

This separating system was used eight or nine years ago where the city wished to lay asphalt and permitted the street railway company to lay brick. The company could not afford a concrete foundation, so it placed a layer of stone ballast on the subgrade and as settlement of the railway strip was expected the strip was separated from the city's portion by these wooden headers. At present the track strip has settled into the subgrade as much as 3 in. It may be admitted that this is not a good condition, but the city's portion of the street has not been affected and outside of the ordinary paving defects it has retained the original surface. No complaint has been made by the city or the property owners that their paving has been injured by our type of construction. As this method was so successful we have applied it on streets where the track is on a concrete foundation.

FIG. 4. LAYING HEADER BETWEEN TRACK AND PAVEMENT

In the *Proceedings* of the American Wood Preservers' Association for 1920, the committee on wood block floor and paving (p. 280) suggests that a proper construction under street car tracks is such as to separate the two parts of the pavement. Municipalities should insist upon street railways separating the track strips from the balance of the pavement construction, and in this way place definite responsibility for maintenance.

Removable sections of pavement at special work and crossings constitute another arrangement of interest to municipalities, the paving being constructed in units

which fit into the peculiar shapes of the paved areas between the rails. Each unit has a floor of 3-in. creosoted plank to which wood paving blocks are secured by toe nailing, together with bolted curbs to fit against the straight or curved rails. The regular paving adjacent to the unit is retained by a transverse header of creosoted timber. As the units rest on the flanges of the rails they retain their relation to them and cannot settle independently of the track. For the removal of bolts in a crossing of two double track lines where this paving was used the work was done in two nights at a labor cost of $55, as compared with five to seven days and a cost of $300, which ordinary conditions would have required.

Further Power Development at Niagara

Extract from Paper by John L. Harper and J. A. Johnson, Annual Meeting, American Institute of Electrical Engineers, Salt Lake City, June 21-24, 1921.

ONE of the first acts of the Federal Power Commission was to give approval to the plans being carried out by the Niagara Falls Power Co. and to issue a license to the company for all the water permitted to be diverted from the American side of the Falls in accordance with the terms of the existing treaty (20,000 cu.ft. per sec.). At the same time it recommended an increase in the allowable diversion and the construction of remedial works to preserve the beauty and grandeur of both the American and the Horseshoe Falls.

This license gave formal federal approval to the plans of development already begun and authorized their completion. These plans included the placing in reserve of the present Niagara plant above the Falls, the construction of a new waterway from Port Day to carry the water now being used in the Niagara plant to the canal basin, below the Falls, the maintenance of Station No. 3 with its thirteen efficient 10,000-hp. units operating under a mean gross head of 217 ft., the extension of this station to the southward, and the construction of new units to utilize the 4,400 cu.ft. per sec. of water that had not been specifically allotted under the treaty and the water now being used by the Niagara plant. Plans were made so that subsequently the water used by these plants may be re-collected at the most favorable point and carried by tunnel past the lower rapids to a power house in the lower river, where the remaining head may be developed.

The first step of this general plan has already been carried out, namely, the construction of what is known as Station No. 3 Extension (see *Engineering News-Record*, Sept. 23, 1920). This extension contains three units, the combined rating of which is 100,000 hp. and together with the other plants of the company uses all the water allowed by the treaty. The second step has just been authorized, namely, the construction of a new tunnel, the installation of the remaining units, and an addition to Station No. 3 Extension. Another step has also been initiated by the granting of a preliminary permit to the Lower Niagara River Power & Water Supply Co., which allows two years for the presentation of plans for the development of the lower river stage. The details of this plan have not been worked out and the date of construction has not been fully decided upon.

Much has been said about the desirability of using the diverted water up to the full head of 314 ft. from the upper river to Lewiston, and when the field is entirely without complication, as in the case of the development of water in excess of the present treaty allowance, a one-stage development will undoubtedly be advisable. The reason for the apparent rejection of this plan for the present diversion may be of interest. The scheme of development now being carried out does not contemplate utilizing the full 314-ft. head in one plant with a long new waterway involving the abandonment of the efficient plant already built. Instead it will be utilized in two successive stages, the first stage utilizing a gross head of 220 ft. and the second stage a gross head of 94 ft.

Broadly speaking, the commercial power capacity of the two-stage development is practically the same as that of the single stage. The problem has been to decide whether the interests of the power consumers and indirectly of the public will be best served by an eventual total abandonment of all the plants that have already been built and the construction of a new plant to utilize in a single drop under the full 314-ft. head the total quantity of water permitted to be diverted under the treaty, or, by conserving as much of the old work as could be conserved without impairing the general efficiency of the use of water and by the construction of new works to supplement the old.

As no further water is at present available, the only source of additional power is the use of some of the present water under increased head. Naturally, the least efficient of the existing plants would be the first one selected for obsolescence, which in this case is the Niagara plant which, operating under an effective head of 140 ft., obtains but 12.1 hp. per cu.ft. per sec. as compared with 21 hp. per cu.ft. per sec. in station No. 3 Extension.

The power will be developed in the further extension to Station No. 3 along similar lines to those followed in the already completed extension. The water will be brought from Port Day through a 32-ft. horseshoe-shaped tunnel at a depth of about 100 ft. below the surface of the ground. From this tunnel the water will be taken to the penstock through a forebay similar to that provided for Station No. 3 Extension. The construction of this tunnel was started on Apr. 25, 1921, and work is now proceeding rapidly from both ends and two intermediate shafts. It is expected that the first unit will be started on or before May 1, 1923.

Rubber Paving in London

London Correspondence

THE Rubber Roadways Co., Ltd., and the Rubber Growers' Association inform me that satisfactory experiments have been carried out in the Southwark Borough of London using rubber for carriageways. Eight years ago 3 sq.yd. of rubber-capped hardwood blocks were laid at the junction of two roads which carry the heaviest traffic in south London. This rubber capping was ½ in. thick and fitted into the hardwood blocks by dovetail connections running longitudinally. Two years later these blocks were taken up for examination and it was found that the major portion of the wear had taken place on the underside of the rubber and on the wood surface; the wear on the upper rubber surface was comparatively negligible and consisted chiefly of scratches. The traffic to which these blocks had been subjected averaged 190 tons per street width yard per hour.

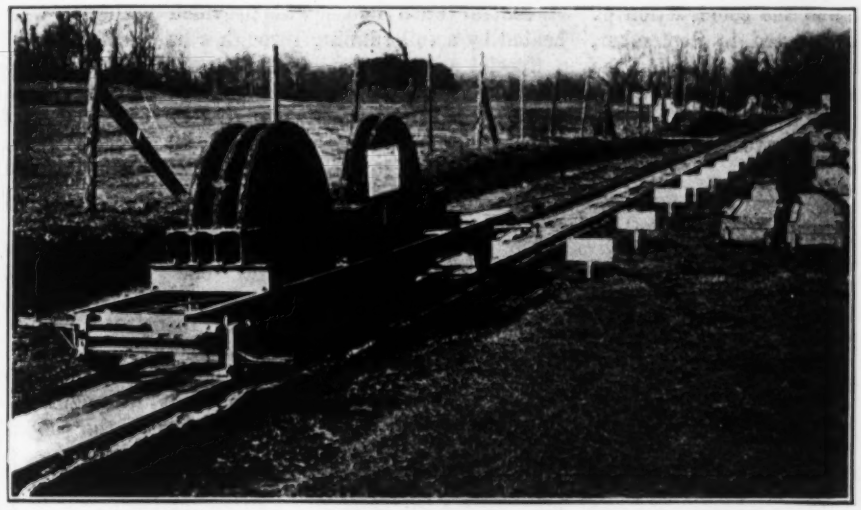
Three years later another experiment was undertaken. The blocks used consisted of rubber slabs ⅜ in. thick, 9 in. long by 3 in. wide and vulcanized to steel plates. These plates were cut so as to produce lugs for holding to a concrete surface. The foundation consisted of reinforced concrete with a surface of concrete made up of grit in the proportion of cement 1 to sand 4. In this latter the lugs of the steel plates were set. The traffic load was about 240 tons per street width per hour. When this type of paving had been in use for several months the rubber blocks worked loose and about 15 per cent became completely detached. The whole area was then taken up and the condition of the slabs and plates showed that this type of paving was not satisfactory for fast and heavy traffic.

Subsequently the steel plate was replaced by a plate of expanded metal imbedded in vulcanite, lugs being added. These blocks have been in use now for about five months and are, so far, behaving satisfactorily.

Wear Tests Show Service Qualities of Paving Materials

Impact a Big Factor—Bituminous Fillers Show Up Well—Rattler Reliable—Sand-Cement Bed Best

THE U. S. Bureau of Public Roads has recently completed at the Arlington (Va.) experiment station a series of accelerated wear tests upon granite block, vitrified brick and concrete pavement surfaces, the results of which are embodied in a report by F. H. Jackson, senior assistant testing engineer, and C. A. Hogentogler, highway engineer, just made public. The tests, which were made under the general direction of Thomas H. MacDonald, chief of the bureau, and A. T. Goldbeck, engineer of tests, consisted of operating a carriage carrying five 1,000-lb. cast-iron wheels, back and forth over a runway 2 ft. wide and 400 ft. long, containing 48 sections of pavement of different types. The conclusions, as given in the report (which will be published in full in the June issue of *Public Roads*) follow:



TESTING MACHINE CARRIED FIVE 1,000-LB. CAST-IRON WHEELS
View shows 48 test sections of pavement forming runway 400 ft. long and 2 ft. wide paved with granite block, brick and concrete.

Granite Block Tests

Although certain limiting conditions, such as the small size of the test sections and settlement at certain points must be taken into account when interpreting the results of these tests, the following general conclusions may be drawn:

1. Bituminous-filled granite block pavements will resist the impact produced by heavily loaded steel-tired traffic as well as cement-grouted pavements.

2. Bituminous mastic fillers are as satisfactory for this type of traffic as straight bituminous fillers.

3. The effect of impact is tremendously increased by irregularities produced by poorly cut blocks.

4. Irregularities of surface or other factors producing impact are more serious with grouted than with bituminous-filled pavements.

5. Slight variations in resistance to wear, such as occur among the commercial granite block from the Atlantic coast quarries, are of much less importance in judging the probable resistance of the block to the action of traffic than has commonly been supposed.

6. Cement-sand bedding courses are more satisfactory than sand or bituminous-sand bedding courses.

Conclusions From Brick Tests

1. The edge protection offered by bituminous and cement-grout fillers is considerably greater for vertical fiber and wire-cut lug than for repressed bricks.

2. The adhesion of bituminous fillers to wire-cut lug and vertical fiber bricks protects surface and reduces wear.

3. With cement-grout fillers the surface becomes a rigid slab and failure occurs because of the breaking of this slab under load and consequent loosening and shattering of the bricks.

4. With cement-grout fillers and sand-cushion construction the bricks must be so thick as to make a slab which will resist without excessive distortion the impact produced by the load moving over it. In such cases the cement-grout filler offers excellent support to the wire-cut lug and vertical fiber bricks. The above results indicate that for sand and sand-cement cushions and for such loads as were had at Arlington thicknesses under 4 in. are impractical.

5. For bricks of sufficient thickness to form a beam which will not be broken under impact, cement grout offers better support to the edges than bituminous fillers. The bituminous fillers cushion the edges, but under certain kinds of traffic (steel tires) allow the edge to be crushed even while the filler remains intact.

6. Tar and tar-mastic fillers form more rigid slabs in cold weather than asphalt and asphalt mastic, and consequently bricks filled with the former tend more toward shattering than those filled with the latter.

7. For the same conditions of brick and type of construction, bricks with rounded edges offer less resistance to wear than those with square edges.

8. Sand cushions are subject to more compression than sand-cement cushions, and the greater compression results in a more uneven surface.

9. Elastic fillers considerably reduce the effects of impact occasioned by steel-tired traffic, and the destructive effect increases with increased rigidity of the fillers, the maximum destructive effect occurring with such fillers as have greatest rigidity. The shattering of the brick and the additional settlement noted on the cement grout sections warrant this conclusion.

10. The resistance to wear of the various pavement sections, as shown from the wear test, is the same as that indicated by the standard rattler test for the bricks comprising the above sections.

Observations on Concrete Paving

The failure of several of the concrete sections was due to transverse cracking and settlement, accompanied by increased impact. Observations would indicate that slag, sandstone, and limestone do not offer as much resistance to cracking as do gravel, trap rock, and gneiss. This conclusion, however, is questionable in the absence of further experiments.

From the tests on the concrete sections there are indications that neither the resistance to wear nor the resistance to cracking are dependent upon the compressive strength of the concrete as determined by 6 x 12 in. test cylinders, that more resistance to wear is afforded by dry concretes than by wet, and that the harder aggregates offer more resistance to wear than the softer. Whether this greater resistance offered by the harder materials would warrant securing them for a road at much additional expense when softer materials are at hand must be left to the judgment of the engineer with full knowledge of the traffic conditions

Winter Work on a Quebec Water-Power Development

Dam Construction Near Chicoutimi Required Long Hauls Over Snow Roads and Special Provisions for Camp Sanitation in Cold Weather—Fire in Camp Impeded Operations

CONSTRUCTION work on a paper-mill power project in northern Quebec during the past two winters was complicated by the remoteness of the site from the source of materials and by the cold weather common to that country. The methods employed and the lay-out of the plant should be of value for reference for future operations under similar conditions. The development, known as the Chute aux Galets Power House and Dam, is located on the Shipshaw River about 23 miles north of Chicoutimi, Quebec, and about 20 miles from the mouth of the Shipshaw. It was built to afford additional power to the Kenogami Pulp & Paper Mills and the Jonquiere Pulp Mill, both owned by Price Bros. & Co., Ltd.

Owing to recent additions to the Kenogami plant additional power was required and the construction of the dam and power house was started in September, 1919, and completed in January, 1921, except for the installation of the two generators, the delivery of which has been delayed.

The dam is 1,185 ft. long with an average height of 24 ft., upon which are erected flashboards 6 ft. high, the purpose of which is to take the pressure of the ice which will form behind the dam, thus saving the concrete from damage. At each end of the dam are concrete core walls built on ledge rock and terminating in the hillsides each side of the river. The power house is of reinforced concrete, built below the falls in a bend of the river and is 55 x 88 ft., with a total height of 94 ft.

LOOKING UPSTREAM AT THE CHUTE AUX GALETS DAM AND POWER HOUSE UNDER CONSTRUCTION

Camp Construction.—The contract for the work was let the latter part of August, 1919, and the contractor immediately started work, which was carried on continuously during the winter. The building of camps was immediately started, the first of these being of logs cut at the site, but later, when a sawmill had been installed, the camps were built of sawn lumber. They were built as far as possible so as to segregate the men according to nationality and occupation. Various sizes of camps were used, as certain classes of men are satisfied to live in larger buildings containing fifty to sixty men, whereas with others this condition causes discontent and smaller camps accommodating from twelve to twenty men were also provided. A "camp boss" with a few helpers and working under the direction of the company's doctor kept the camps in a clean and sanitary condition. All of the camp rubbish and kitchen refuse was burned in an incinerator. A disinfector, consisting of a tight wooden tank built strong enough to take 15 lb. of steam pressure, was erected near one of the boilers and piped to it. Used blankets and clothing of a suspicious nature were subjected to treatment under this steam pressure. A central wash house was provided with hot water heated by a coil running through a large camp stove.

Special attention to the matter of sanitation as well as the general comfort of the men in camp was found to be a small investment, bringing in large returns in the saving of replacement of men and consequent costs of transportation and shortage of help. Two large dining halls, each accommodating 230 men, were provided, with one central kitchen serving both. A separate dining room was provided for the staff.

While the camps were being built the plant was transported to the job and installed, cofferdams were erected and excavation started for the power house, penstocks and headworks.

Transportation.—The matter of transportation was one of the most serious problems in connection with this work. The nearest railroad was at Chicoutimi and to get material to the job it was necessary to transport it across the Saguenay River and haul it 22 miles to the work. Two gasoline-driven scows were built by the contractor for the river transportation. These scows are 80 ft. long and have a capacity of about 55 tons. Forty-horsepower heavy-duty marine gasoline engines were installed and proved satisfactory against a very heavy flow of tide, the Saguenay River being subject to a tide variation of from 15 to 20 ft. During the winter teams and sleighs were used for transporting across the Saguenay.

A stiff-leg derrick and a warehouse were installed on the wharf at Chicoutimi and material was unloaded from cars to the scows by this derrick or stored temporarily in warehouses. Cement and small material were loaded in skip boxes which were set on the scows or sleighs.

On the opposite side of the river in the village of St. Anne and about one mile upstream were installed

another derrick and warehouse, shown in the view. The base of this derrick is about 210 ft. above the river level at low water and is located on the edge of a steep cliff. The boom is 85 ft. long and loads can be lifted directly from scows and set on wagons or sleighs. By the installation of this derrick a hill leading up from the existing pier, about three-quarters of a mile long with gradients up to 20 per cent, was eliminated from the hauling route.

The road from St. Anne to the Chute aux Galets is for the most part through an unproductive section and practically no work has been put on it to improve the natural condition of the roadbed or the profile. A large part of the road is simply a right-of-way cut through the woods with no ditching or grading attempted. About two-thirds of the route is through clay and the balance is over rocky hills. During the spring and autumn and a large part of the summer months the clay portion becomes worked up into a soft mass in which a wagon will sink to the hub. The rocky hills are outcroppings of limestone ledges and form extremely steep grades, many of them being over 18 per cent. These rocky slopes are generally bare and furnish insecure footing for horses. Fifteen hundred pounds was a difficult load for a team on these hills and during the spring a team had difficulty in hauling 1,000 lb. over the clay portion of the road.

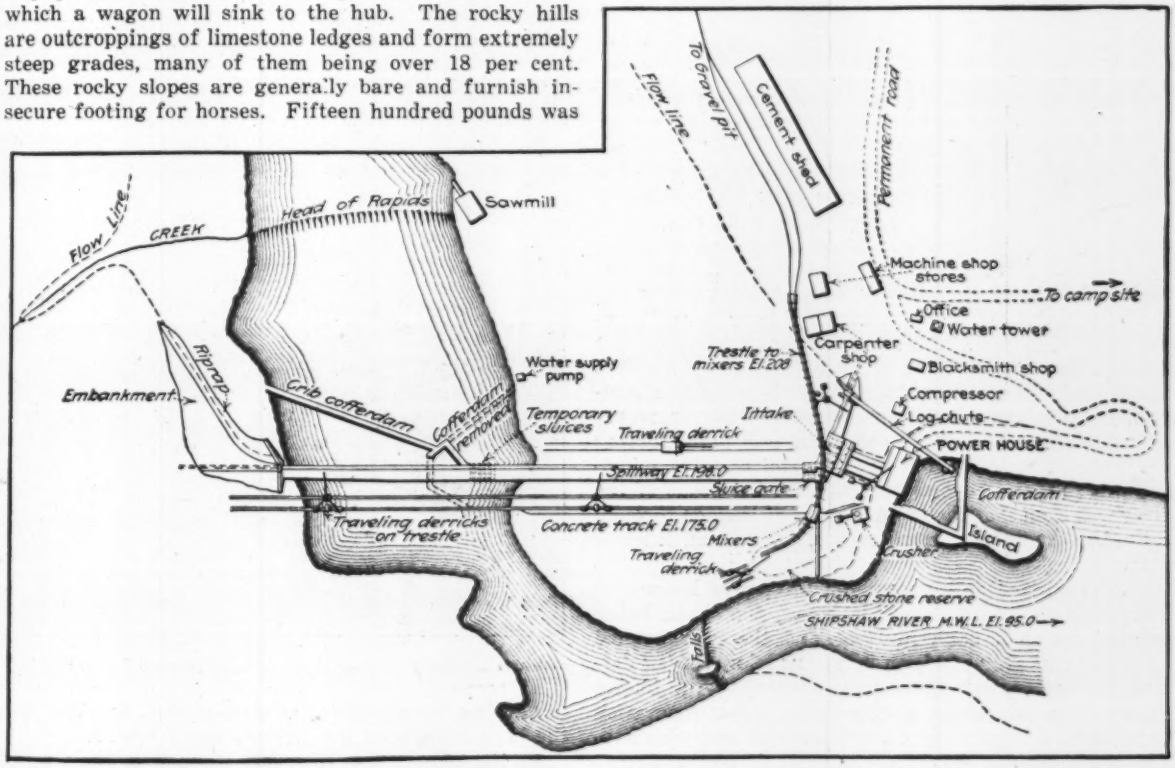
It was decided to transport as much of the required material as possible during the winter months on snow roads and during the fall of 1919 only such supplies and plant as were immediately necessary were hauled.

A winter road was located in the fall, the right-of-way arranged for and cleared. This cut off about four miles from the distance and was located so that the steepest grade was only 5 per cent and there were only four grades of more than 2 per cent. The road was located for a large part through a swamp which would have rendered it impassable in summer, but provided a very firm and level road when frozen and when there was sufficient snow. About 10 in. of snow was required to make the road sufficiently even for hauling. Hauling on the winter road was started on December 15 and during the winter months about 7,000 tons were transported to the job, of which 5,300 tons consisted of cement. The contractor used generally four-horse teams with heavy logging sleighs, and in addition to this from 50 to 100 hired teams were employed on the job a large part of the winter. Two snow plows were used to keep the road clear. These were hauled by six horses and were sent over the road one from each end after a storm. No attempt was made to ice the roads owing to the heavy drifting of snow to which they were subjected.

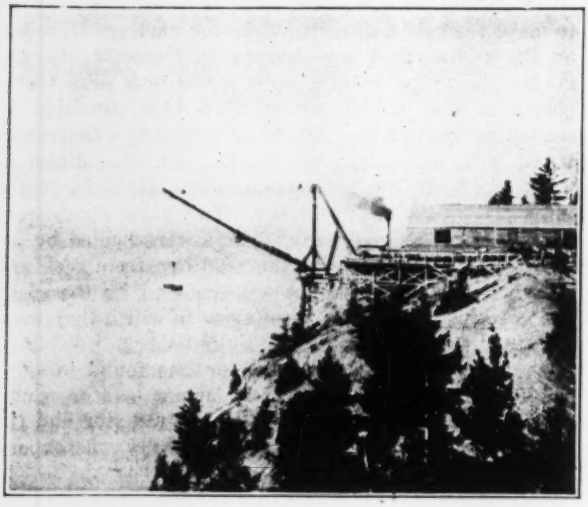
A 10-ton Holt caterpillar tractor was found to work satisfactorily on the snow road under winter conditions. By the use of kerosene in the radiator and the use of special lubricating oils no difficulty was experienced in operating in temperatures as low as 42 deg. below zero.

All the plant and cement and as much of the stores as could be anticipated were hauled during the winter. The winter road broke up on April 10 with the spring thaw and was then abandoned.

Construction Operations.—An 18-mile transmission line from an existing power house was started in the fall as soon as material for it could be secured. The steel poles were all erected and concrete bases poured for same before very cold weather set in, but owing to slow delivery of some of the material the stringing of conductors was delayed considerably and was done in temperature as low at times as 46 deg. below zero. Thermometers were carried by the linemen and the tension regulated



LAYOUT OF CONSTRUCTION PLANT ON CHUTE AUX GALETS POWER HOUSE AND DAM IN QUEBEC



DERRICK LIFTING MATERIAL 210 FT. FROM THE SAGUENAY RIVER BELOW

for the existing temperature. While the transmission line was being erected wood-burning boilers were used on the job for steam power.

The cofferdam for the power house consisted of a log crib filled with rock from the penstock excavation and sheathed with 2-in. tongue-and-groove lumber on outer face and toe-filled with earth excavation from the headworks. The maximum depth of the cofferdam was 28 ft. Two 10-in. centrifugal pumps easily pumped out the cofferdam and one 10-in. pump later kept it unwatered. The north cofferdam for dam excavation was built in two sections, the south half of the river first being enclosed and the dam containing the five temporary sluices was built across one-half of the river; later the north half of the cofferdam was built, forcing the water through the temporary sluices. No pumping was found to be necessary here as the grade of the river was such that the small amount of leakage through cofferdam was easily taken care of by a small interior dam.

The earth and rock excavation for power house and penstock was loaded into skip boxes, the earth being dumped on spoil bank in river and the rock hoisted directly to crusher platform by means of a stiff-leg derrick. The crushed stone was elevated by a bucket conveyor to the stone storage pile. The excavation from the headworks and south core wall was also handled with stiff-leg derricks.

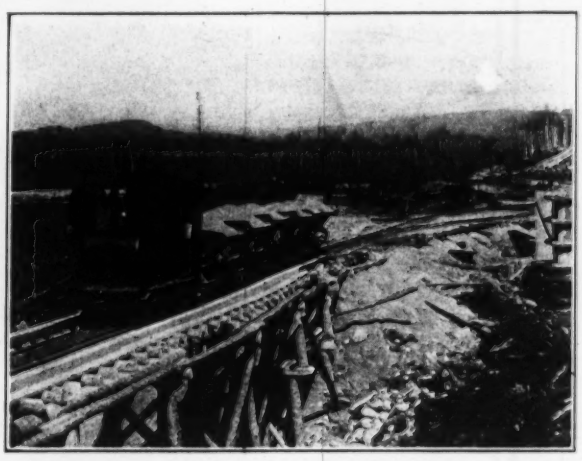
Excavation for the dam was removed by a traveling steel derrick, with 96-ft. boom and equipped with a 1½-yd. clamshell bucket, the excavated material being simply deposited in the spoil bank below the dam.

The concrete was mixed with two electrically driven mixers, fed from overhead hoppers. Two of these hoppers contained gravel and the other two crushed stone. A trestle ran over the top of these two bins. Gravel obtained from a pit about 3,000 ft. from the mixer plant was loaded into cars with a traveling derrick and clamshell and hauled by four-ton oil-burning locomotives to the bins. The crushed stone was loaded into cars with a traveling derrick and orange-peel bucket and also hauled to bins by cars and locomotives. Cement was hauled out to the mixer plant and dumped into a chute from the trestle.

A concrete track ran between the two mixers and flat cars with 1-yd. concrete buckets hauled by locomotives conveyed the concrete to the dam, where it was deposited in the forms by two traveling derricks on tracks parallel with the dam. The concrete for power house was conveyed in a similar manner, except that V-shaped, 1-yd. side dump cars were used, which were dumped into a hopper, the concrete then being deposited in the forms by means of chutes.

Fire in Camp.—On June 20, 1920, after a prolonged dry spell, a forest fire which started several miles west of the job spread to the work before a high wind and jumped 800 ft. across the river to the camps and other structures on the job. All of the buildings, including the camps and dining rooms, stables, cement shed, office, storehouse, compressor house, blacksmith shop, machine and carpenter's shops and sawmill were destroyed, as well as the electric wiring, a large part of the plant and all of the stores. The destroyed plant included most all of the motors, two locomotives, one electric hoist, six transformers, compressor, machine-shop and carpenter-shop equipment, sawmill equipment, wagons and sleighs. At the time of the fire about 350 men were in camp and of this number about 120 remained and saved the balance of the plant.

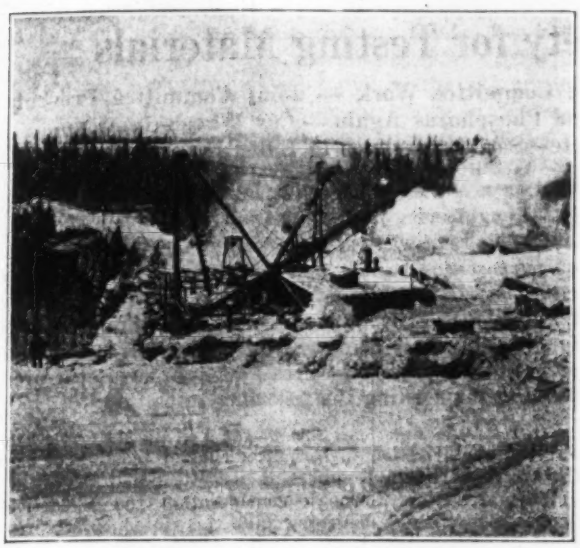
The cement shed contained at the time of the fire 105,000 bags of cement which had been hauled to the



GRAVEL TRAIN PULLED BY OIL BURNING LOCOMOTIVE

job during the winter. The cement shed, together with the bags containing the cement, was a total loss.

As the cement was then left exposed to the weather every effort was made to get it covered before rain could complete its destruction. All of the canvas that could be secured in the vicinity of Chicoutimi, as well as several tons of dryer felt from the paper mills at Kenogami and several hundred rolls of roofing paper, were rushed to the job and the pile of cement, which was about 350 ft. long and about 65 ft. wide, was covered twenty-four hours after the fire took place. Although no rain had fallen for 30 days previous to the fire, showers occurred within 36 hours after. The temporary covering put over the cement consisted of two-ply roofing paper supported on poles. The poles were laid on a slope to a peak over the center of cement pile and down to the ground on each side; a layer of dryer felt or canvas was then tacked over the roofing paper to prevent its being torn off by the wind. A ditch was dug around the pile to prevent water pen-



HEADWORKS CONSTRUCTION IN A CANADIAN WINTER

etrating to the bottom of pile. This roof remained until the cement was finally used in the work several months later and proved very satisfactory. The salvaged cement was rebagged.

About 75 per cent of the salvaged cement was ultimately saved and used in the work, the balance having become hardened by the heat was discarded. It was found from tests of average samples taken throughout the pile that the tensile strength of the salvaged cement was about 18 per cent lower than that found for the same cement when tested from the carload shipment. A larger amount per batch was therefore used.

As a result of the setback due to the fire unusual efforts were required to complete the concrete work before cold weather. The destroyed plant and stores were speedily replaced and tents were provided for temporary camps until buildings could be rebuilt. Most of the men who had left the job at the time of the fire remained in Chicoutimi and were housed and fed there by the company. As the tent camps were installed the men were gradually brought back. The work of excavating was resumed four days after the fire and concrete work started six days later. In about a month the work was being carried on as before the fire.

With the exception of closing the temporary sluice gates and the concrete required around the waterwheels in the power house and a few miscellaneous items all of the concrete work was completed before cold weather so that little heating of concrete materials was necessary. Two of the temporary sluices were closed before cold weather, but it was necessary to close the other three in January, 1921, and this proved to be a rather difficult undertaking. Stop logs were set in the ends of the sluices in grooves provided and calked on the inside. Then the interior was pumped out and cleaned of ice and the sluiceway poured from a shaft up through dam. When the shaft was filled it formed a static head of about 28 ft. of soft concrete which completely filled every part of sluiceway.

Owing to the necessity of allowing enough water to pass through to keep a lower power house in operation the stop logs were brought up gradually and some water allowed to pass over them while they were being set. This caused ice to form about the logs and great difficulty was experienced in getting them tight. The concrete in these sluices, which was poured in very severe weather, was heated by running live steam into the sand, crushed stone and water used in the mixing.

The work was designed by George F. Hardy, of New York City, who was represented on the work by F. M. Kuchar, resident engineer. The contractors were Fraser, Brace & Co., Ltd., of Montreal.

A View of "Value for Rate Base" and "Value for Compensation"

DISTINCTION between "value" to be used as a rate base and "value" to be used as a just compensation figure for purposes of condemnation was drawn in the recent decision of the California Railroad Commission in regard to the taking over of the power plant of the Northern California Power Co. by the city of Redding. That portion of the commission's opinon dealing with this phase of the case follows:

It has been a source of confusion quite evident in this proceeding that the distinction was lost sight of between a rate base and a just compensation figure. We have no patience with the argument that in a reproduction cost estimate for rate-making purposes a power line pole should stand at one figure and that in a reproduction cost estimate for condemnation purposes the same pole should stand at another figure. It seems clear to us beyond argument that a given propery item valued according to a given method must have in its estimate of value new and in its estimate of value depreciated, the same figures no matter for what purpose that estimate may be used. To conclude, however, that because of this statement the rate base and the just compensation of a public utility plant must be the same, seems to us altogether erroneous.

The difference in the final result (depending on whether a given public utility property is to be valued for just compensation purposes or for rate-making purposes) will be found to lie not in the value given to different property items under various methods of valuation but rather in the answer to the final question of whether, in a rate case, the basis for the fair return should be "value" or "investment" or "sacrifice." In a rate case, the rate-making authority is concerned with finding the sum on which a fair return should be allowed. The problem involves the determination of what property is reasonably used and useful in the public service, what capital expenditures have been made by the utility even though these expenditures may be on property not owned by the utility, and other similar questions. Also the matter of going concern, in so far as going concern is an element resulting from the actual or prospective ability to realize profits, cannot enter into the rate problem. If it were held otherwise there would follow the absurdity that the higher the rate, the greater the earning power; the greater the earning power, the larger the going concern; the larger the going concern, the higher the rate, *ad infinitum*.

An essentially different problem confronts the Commission when it has to find just compensation. Beyond a question it must, in that case, find a fair value of the property as of a given time with all of the elements making for increase or decrease and for loss or gain attached to it. And what property items are to be valued is settled by the description of the property desired to be taken, by which description the Commission is governed.

If, therefore, agreement can be had on the proposition that it is legitimate to consider various estimates of value on various theories (each with necessarily different results) and that in the last instance these various estimates, elements and measurements must be resolved by the Commission into "just compensation" and that "just compensation" can be found only if all factors (to the exclusion of none) having a bearing on present day value are given their proper weight, then it will be possible to discuss the problem on common ground and with an intelligent vocabulary.

Meeting of American Society for Testing Materials

Many New Specifications Adopted as Result of Active Committee Work — Joint Committee Presents Draft of Specifications for Concrete—Sulphur and Phosphorus Again — Car Wheels Improvement—Prof. Talbot on Proportioning Concrete—Society Declines to Enter Federation

WORKING in its smoothest and most efficient manner as an organization for producing and perfecting technical specifications, the American Society for Testing Materials in its annual meeting at Asbury Park last week achieved a remarkable performance, probably without precedent in its history, by dealing with more than 150 specifications. Of these, 71 were new, being presented for the first time and adopted as tentative standards, while 63 were revised; others were advanced from tentative to standard rank. Of course this required machinelike method of working; some forty steel specification were disposed of in bulk by a single ballot. The flatness of this procedure was relieved in the closing session, however, by a flash of fire reminiscent of the society's liveliest days, in the shape of a hammer-and-tongs set-to over chilled car-wheels, which resulted in proving the need and feasibility of chemical limits for car wheels, and in making wheels safer by requirements superior to those set up by the Master Car Builders and the American Railroad Association, and superior to those which the committee on cast iron was content with.

Committee activity was marked. Evidently a great deal of work was accomplished during the year, for progress was shown in nearly every part of the field on which the society has hitherto entered, while in addition work was begun on a number of new subjects. Even where no specifications resulted, research work was reported.

Concrete and allied subjects played a large part in the meeting. Three important contributions to knowledge were made in this field—the first presentation of the Progress Report of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete, the submission of four tentative methods of test and one tentative specification by Committee C-9, on Concrete and Concrete Aggregates, and a paper by Prof. Arthur N. Talbot on proportioning concrete, which proved to be a remarkable study of the relation of the voids in a mix to the resulting strength and density. There were some significant developments in the field of metals, however, outside of the car-wheel matter just mentioned. The war relaxation of sulphur and phosphorous allowances came up for action again, with a less satisfying outcome than had been anticipated. A decidedly new proposal in rail specifications was prepared by the steel committee, but in the last minute the committee decided to withdraw it, leaving the subject about where it was before.

Some twenty or twenty-five technical papers were read. This part of the program seemed rather weaker than at previous meetings, and was prominently distinguished only by Prof. Talbot's paper.

Society Declines to Enter Federation

The deferred question of affiliating with the Federated American Engineering Societies was placed before the society by the Executive Committee after the latter had given repeated careful consideration to the matter during the year. The committee stated its views *in extenso*, expressing a favorable opinion of the federation plan as a means of consolidating thought and purpose in the engineering profession and as a means of cultivating public relations, but also pointing out the divergence of purposes of society and federation. The deciding question was that of finances: as the required contribution to the F. A. E. S. could not be taken from current funds without curtailing the society's work, and as the committee regarded an increase of dues unwise, it proposed to the meeting the following resolution:

Whereas, the American Society for Testing Materials has received an invitation to become a charter member of the Federated American Engineering Societies; and

Whereas, after thorough consideration the Executive Committee, although believing that the stated objects for which the Federation is organized merit the support of engineering orginazitions and engineers in general, has recommended that the present finances of the Society do not permit the Society to accept membership in the Federation at this time; therefore be it

Resolved, that the American Society for Testing Materials, after consideration of this invitation in annual meeting assembled, regrets to advise the Federated American Engineering Societies that it is financially unable at this time to accept the invitation to become a charter member of the Federation.

This resolution was passed, after considerable discussion of an amendment proposed by Richard L. Humphrey calling for letter ballot of the membership on the joined questions of entering the federation and raising the dues. Following the defeat of this amendment and the passage of the Executive Committee's resolution, Mr. Humphrey moved the substance of his amendment separately, but it was defeated on division by 62 to 32. W. M. Kinney then offered a resolution stating that the meeting is not opposed to the Executive Committee considering joining the F. A. E. S. at the proper time and when in its opinion the step is desirable; the resolution was accepted.

Society's Influence on Public Works

Retiring President George S. Webster addressed the society on its influence upon the execution of public works. Recalling the foundation of the Philadelphia city testing laboratory in the early nineties at his initiative, and its relation to the growth of the society, he described how his experience showed the municipality to profit from the work of the society. Some of the most pointed paragraphs of the address will be reproduced in a later issue.

Joint Committee's Specifications for Concrete

Reporting in a preliminary way after 16 months' work by 25 men (five each from the American Society of Civil Engineers, the American Railway Engineering Association, the American Concrete Institute, the Portland Cement Association and the American Society for Testing Materials), the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete submitted a tentative specification covering all phases of the subject. The committee is a successor of the old Joint Committee which presented progress reports in 1909 and 1912 and a final report in 1916. The present

report is submitted to the constituent societies for discussion limited to not less than six months nor more than one year. Such discussions are then to be referred to the committee for consideration in the preparation of a final report. The report is made public at this time, although it is distinctly to be considered as only a preliminary draft. The committee meanwhile is continuing its deliberations. In fact, it held almost continuous sessions during the meeting at Asbury Park.

The important difference between this and previous reports of the Joint Committee is that it is a specification. The final report of 1916 "is not a specification but may be used as a basis for specifications." The current specification takes up the entire subject of concrete under the headings "Materials," "Proportioning and Mixing Concrete," "Depositing Concrete," "Forms," "Details of Construction," "Waterproofing and Protective Treatment," "Surface Finish," and "Design," which latter includes as subheads the subjects flexure, diagonal tension and shear, bond, flat slabs, reinforced-concrete columns, footings, retaining walls, shrinkage and temperature stresses and working stresses. There are in several cases alternate paragraphs on the same subject, notably in the method of proportioning.

It was announced that in so far as the American Society for Testing Materials is concerned sections of the specifications will be referred to specific committees, which must report inside the year. On that basis the report was received by the meeting and the decision as to printing it other than in its submitted form as a preprint left to the executive committee.

A digest of the specifications will appear in an early issue of *Engineering News-Record*.

Two Steel Questions and Cast-Iron Wheels

When F. M. Waring for the committee on steel reported on 41 revised and two new specifications, there was the usual full attendance, promising a free discussion of the leading questions: (1) removal of the special 0.01 per cent war allowances on sulphur and phosphorus that had been permitted last year to remain in 14 specifications, and (2) a new departure in rails, made in order to come nearer to agreement with the American Railway Engineering Association, by providing two separate specifications for ordinary and for "special quality" rails respectively. The discussion did not materialize, however, and the action recommended by the committee was approved by a single blanket vote.

Sulphur and Phosphorus—The war allowances on sulphur and phosphorus were not finally abrogated, but were retained as to steel castings and (for sulphur only) as to structural steel for locomotive, car and ship use. By action taken a year ago, the allowances had been removed from over half the specifications originally affected, but had been left in force for bessemer rails, splice bars, reinforcement bars, tie plates, track bolts, and building steel; and for open-hearth rivet steel, tubes, chain, castings, and three grades of structural steel. In this year's report the committee recommended restoring the original low limits for all bessemer steel and for rivet steel, tubes and chain; but, it says, "as against these changes, it is felt the extension in sulphur from 0.05 to 0.06 per cent in the three classes of structural steel must be retained due to the heavy tonnages involved and to the continued difficulty in obtaining low-sulphur fuels and melting stock. It will be noted that the sulphur extension will be removed on the materials which are to be worked hot and allowed on structural material which are to be fabricated cold. The recommendation to continue the extension of both phosphorus and sulphur in steel castings is made in the belief that the same difficulties with fuel and melting stock exist in this industry."

Tests carried out by the Bureau of Standards joint committee on the effect of sulphur and phosphorus were reported in a meeting of that committee held during the week, but have not yet been made public. They represent only a small part of the full program, and deal only with sulphur in rivet steel. Their general indication is that static qualities are not affected by high sulphur, but impact resistance is seriously lowered.

When this investigation was begun, nearly two years ago, fears were expressed in some quarters that it would operate to keep up the high sulphur and phosphorus limits. Only a limited verification of these fears has developed, for the steel committee says: "Our society is looking to that investigation [of the joint committee] for final advice as to suitable limits, but until the work is completed it is believed that the changes now recommended may be made with safety."

Rails—Fundamental divergence between the rail requirements of the American Railway Engineering Association and the "market" specifications of the American Society for Testing Materials and of the rail makers resulted in continuous effort during the past two years toward harmonizing the two views. It has developed, however, that a compromise is not feasible. One solution of the problem was proposed recently by G. J. Ray, chairman of the rail committee of the A. R. E. A., namely to formulate a basal "market" specification and separate individual clauses each covering an element of higher quality, capable of being added to a particular rail contract on the basis of the extra cost entailed.

Another course was taken by the A. S. T. M. steel committee in a proposal made ready for presentation to the society but withdrawn just before the meeting. This involved the establishment of two separate specifications, for ordinary and for special quality rails, of equal rank as standards; the former would be the present A. S. T. M. specification, the other substantially that of the A. R. E. A. This recommendation and a "special quality" specification to match were actually preprinted, the committee explaining that "by adopting these two specifications it is thought that the society will make it possible for buyers to choose the specifications best suited for the service for which their rails are intended. This course, in our judgment, is necessary, because the requirements of rail buyers are by no means uniform. Where the amount of traffic and general service conditions are more severe, a buyer might well want to purchase rails subject to more rigid requirements than would be the case if the service conditions were more severe."

But this explanation as well as the "special quality" specification were withdrawn before presentation, on reconsideration by the steel committee at a session held early in the week. When the subject came up in meeting, the society did not trouble to inquire farther into the matter.

A specification for car wheels, without chemical requirements, was submitted to the meeting by Dr. R. Moldenke for the committee on cast iron; and imme-

diately afterward a strong argument for limiting sulphur, phosphorus and combined carbon to reduce the risk of wheel breakage was advanced in a paper by H. J. Force (Lackawanna R.R.). Mr. Force's statistics indicated an alarming number of cracked and broken wheels, and his analyses showed that the elements just named are high in wheels that crack in the plates or break under traffic. He proposed limits of 0.32 per cent P, 0.17 S, and manganese at least three times the sulphur, with combined carbon not over 0.85; such wheels, he said, will not fail in the thermal test, and indeed this test should be made longer so as to detect all thermal weakness. G. E. Doke (New York Central) supported this argument.

Four or five representatives of car wheel makers discussed the chemical-limit problem. They declared their readiness to work to the limits suggested, and stated that they favor any step toward wheel improvement. C. D. Young (Pennsylvania R.R.) questioned the need for chemical limits, and C. A. Ripley (Santa Fe) reported that on his line the trouble with wheel breakages on mountain grades, where long brake application has to be made, was overcome by adoptng the arch plate design of wheel and by putting heavier wheels on refrigerator cars, which generally were equipped too light; chemical content appeared to be without influence on the case, but he nevertheless favored chemical limits if shown to be helpful. Robert Job told of the conclusion reached on the Philadelphia & Reading twelve years ago as to the harmful effect of exceeding limits nearly the same as those demanded by Mr. Force, and the subsequent adoption of even closer limits on the Lehigh Valley. All this was in the face of the fact that the M. C. B. and American Railroad Association specifications have continued to ignore chemical composition.

As a result of exceedingly active discussion in the sense of the above, the committee presented a supplementary chemical specification, with phosphorus and sulphur somewhat higher than the above-quoted limits in order to meet the foundry conditions in southern and western territory without excessive cost. The amended specification was adopted by the meeting.

Talbot on Proportioning Concrete

Prof. A. N. Talbot (University of Illinois) presented his paper on proportioning under the title, "A Proposed Method of Estimating the Density and Strength of Concrete and of Proportioning the Materials by the Experimental and Analytical Consideration of the Voids in Mortar and Concrete," the title being so detailed, the author explained, in order to express exactly the contents of the paper. It is in effect a return to the old void theory of proportioning concrete, amplified by a consideration of the bulking action of water and reduced to quantitative terms by the intensive study of a number of aggregates. The paper states that density of concrete is a direct measure of its strength, quality and methods of manufacture being equal, and that density is in inverse proportion to the voids, in other words, the space not occupied by cement or aggregate. In most concrete the mortar more than fills the voids in the coarse aggregate, therefore the voids in the concrete are a function of the voids in the mortar. For the same sand the voids in the mortar vary with different amounts of cement and with different amounts of water, and there is a certain water content which will give a minimum amount of voids. For any sand these values may be established by test and curves drawn. At the same time tests may establish the relation between voids in concrete and its strength. The combined use of these data will permit (1) the comparison and acceptance of aggregates, (2) the design of concrete mixtures for definite densities and strengths, (3) judging the influence of a change in the volume of the mixing water, (4) finding the amount of mixing water and (5) estimating the strengths that may be expected with given concrete mixtures.

As in the other recent theories of proportioning concrete, it is stated that the theoretical optimum mix is rarely one that can be used in practice, being either too dry or too harsh, and on that account some measure of flowability is necessary for a complete use of the method. Such a measure being established, however, all of the variables of the mix of the desired flowability are determinable by the method.

In the study preceding the paper Professor Talbot made many tests and examined the data of many others which seem to confirm the theories advanced, but the investigation is continuing. Data on some of the sands and concrete studied are contained in the paper, which will be abstracted in an early issue.

The discussion on the paper was limited, and not directed in specific criticism, either favorable or adverse, except to commend the paper as a return to what seems to be a more rational basis of concrete proportioning.

Study of Concrete Aggregates

After a long period of unproductiveness, Committee C9 at last reported significant results. It has considered its province the study of the material concrete, which involves its make-up and its testing but not its method of design or construction. This year the report outlined the progress it has made in this study, the result mainly of an ordered series of tests made for some years in a number of laboratories. The report says that the committee recognizes "the importance of the aggregate in the make-up of concrete and the necessity for well-defined tests for acceptance and for economical use . . . and the necessity for research in determining the nature of organic matter deleterious to concrete." These two features, according to the committee, have become more and more the prime factors in dealing with materials for concrete. In the abstracts on another page of this issue are given the conclusions of the committee in its work so far. In pursuance of these studies the committee submitted four tentative methods of test—for making compression tests, for testing organic impurities (which is the well-known Abrams-Harder colorimetric test), for sieve analysis for aggregates and for securing specimens of hardened concrete from the structure. Together with these was submitted a tentative specification for concrete aggregates, which differs somewhat, mainly in grading requirements, from the analogous clauses in the specifications of the Joint Committee. All of these were accepted by the meeting.

The committee further reported that it was engaged in the following lines of research:

1. Laws of mechanical mixtures of cement and aggregate.
2. Further researches on impurities in natural aggregates.
3. Investigations of coarse aggregates to determine their relative importance and value for concrete mixers. Included in this study is the use of slag for concrete, with the view to the formation of rules for its acceptance.

4. The best type of specimen for mortar test, whether tensile briquets, or compression cylinders, or transverse bars. Results so far show comparatively little choice between tension and compression, with the transverse test in less favor.

5. The distribution of aggregate materials throughout the country is being studied in collaboration with researches made by the Bureau of Standards.

6. Specifications for concrete are being analyzed and reviewed, but largely in collaboration with the Joint Committee.

7. Testing of field concrete after it is in place is under investigation.

Other Facts About Concrete

The two most carefully developed methods of making consistency tests of concrete—the slump method and the flow-table method—were the subject of two papers and some discussion. In the first W. L. Schwalbe (University of Illinois) gave as the result of tests made in connection with the test of a concrete mixer at Purdue University last year the conclusion that "the relative consistencies are more truly indicated by the flow table for a greater range of consistencies than by the slump test." In the other paper by Watson Davis (Bureau of Standards), the value of the flow-table in examining the set of both cement and concrete is studied and the conclusion reached that the apparatus may be expected to replace the Vicat or Gillmore needle in cement tests and can be used to give valuable constructional information for concrete. The latter paper is to be abstracted in a later issue.

In the discussion, the need for standardizing the flow-table was emphasized and C. M. Chapman (New York) called attention to the fact that the flow-table is covered by a patent (No. 1,233,843, granted in 1917), which at one time was offered to the society for control. The offer was then refused, but Mr. Chapman, in whose name the patent was taken, thinks that the offer would be renewed if the society would consider it. The president stated that the matter would be called to the attention of the executive committee.

Prof. Duff A. Abrams (Lewis Institute) presented in abstract a paper embodying the results of 10,000 tests into the wear of concrete under different conditions of composition and manufacture. The results are stated in the abstracts on another page. They apparently warrant the conclusion that wear is in inverse proportion to strength and that further tests on wear are not necessary, particularly as in the stucture where wear is most evident, the concrete road, it is both uniform and relatively small.

L. G. Carmick (Bureau of Public Roads) reported some tests on the suitability of blast furnace slag for concrete aggregate, in which he found a demarcation in composition between slags which disintegrate and those which do not. He further found that when disintegration did occur, it happened within a week of cooling. The tests were admittedly only preliminary and given for information in further studies. A paper by M. Y. Seaton (Midland, Mich.) pointed out the types of tests which furnish data on the quality of plastic calcined magnesite, which forms a part of the oxychloride cements used in floorings. Prof. F. E. Giesecke (University of Texas) added some data to that he has for some years presented on the efficacy of rodding concrete to increase its strength.

In the report of Committee C-7, on Lime, results were presented of tests in several laboratories on the effect of hydrated lime inclusions on the strength of concrete. One of these, in the laboratory of the State Highway Department of Delaware showed that, with certain sands only, a 5 per cent inclusion slightly increased 28-day strength. Greater inclusions weakened the concrete. Prof. D. A. Abrams, on the contrary, cited a series of tests made in the past year which confirmed his tests reported last year, to the effect that, even for small proportions, hydrated lime reduced concrete strength in proportion to its quantity. The State Highway Department of Pennsylvania showed material loss in strength for 5 and 10 per cent inclusions and that of New Jersey that somewhere between 2½ and 5 per cent there is a return to strength loss.

Major Items of Committee Reports

Paint—For the first time, pigment specifications were presented by the committee on Preservative Coatings. Though they are mere adaptations from government specifications published within the past year, they mark the beginning of the committee's furnishing results directly applicable to the consumer's needs.

Valuable information on the most effective way to prepare steel surfaces for painting was given by a subcommittee as the preliminary result of two series of long-time exposure tests. It shows that generally hand cleaning is equal to that by sandblast or pickling. Further quotation of the findings is made in another column.

Timber—In addition to wrestling with the problem of bringing its new grading rules into practical use, the committee has started on an interesting study, of very direct engineering use, namely the interpretation of timber test records as regards working stresses. This study has already resulted in interesting preliminary recommendations.

Lime—A method of distinguishing between limes of good and poor plasticity has been devised. Panel tests of lime plaster are under way. A means of measuring proper burning is to be sought.

Road Materials.—Extensive work on bituminous materials was revealed by the presentation of eight new specifications; one for calcium chloride for dust prevention was also present. The others include tar and tar cement for surface treatment and repair, cold and hot, and for tar pitch block filler.

Petroleum Products—Lubricants were assigned to the committee during the year, in addition to other petroleum products, and a great expansion of work resulted, covering the range from gasoline to paraffine wax and petroleum tests. The committee reported 13 test methods as new tentative standards.

Corrosion of Iron and Steel—The first definite conclusions yielded by an elaborate series of exposure tests of steels with and without appreciable copper content were reported. The copper-bearing steel has been found distinctly superior in atmospheric exposure, but not in mine water immersion, though the latter tests are less advanced.

Drain Tile—The committee now has road drain tile under study. The main research is concerned with resistance to acids and alkalis in soil, on which five separate investigations are in progress, being coordinated by the committee.

Textiles—Specifications for one size of tire builder fabric were worked out, and definitions relating to mechanical fabric were formulated. Much other work

in this field is still uncompleted. Fabric testing machines are under study.

Tile, Brick and Refractories—Less rapid progress was indicated in these fields than in most of the others, but the study of the relation between density and fire resistance that has been begun by the Building Tile committee represents an investigation of advanced purpose. One of the present conclusions is reflected in the abandonment of the absorption test for tile. In brick, a specification for clay sewer brick was reported. The Refractories committee presented a test for spalling action of fireclay brick.

Insulating Materials—A test for mechanical strength of electrical porcelain was a feature of the committee work in this field. Other work dealt with transformer oil and insulating varnish testing. Separate work in the same field by the Rubber Products committee produced specifications for linemen's gloves, cable insulation and the like.

Technical Papers

Of the twenty-five papers presented, the following not previously mentioned are cited: "Secondary Reference Standards in Process Problems of Color Measurement," by H. S. Busby; "Stress-Strain Measurements on Paint Films," by H. A. Nelson (New Jersey Zinc Co.); "Plastic Flow Through Capillary Tubes," by E. Buckingham (Bureau of Standards); "Improvements in Apparatus for Testing Petroleum Products," by T. G. Delbridge (Atlantic Refining Co.); "Some Mechanical Properties of Hot-Rolled Monel Metal," by P. D. Merica, R. G. Waltenberg and A. S. McCabe; "Magnetic Spring Testing," by T. Spooner and I. F. Kinnard; "Impact Tests on Cast Steel," by F. C. Langenberg (Watertown Arsenal); "Comparative Tests on Steels at High Temperatures," by R. S. McPherran; "A Test for Shock Strength of Hardened Steel," by C. E. Margerum; "Tests of Soils with Relation to Their Use in the Subgrade of Highways," by A. T. Goldbeck and F. H. Jackson (Bureau of Public Roads); "Measurement of Impact of Motor Trucks on Roads," by E. B. Smith (Bureau of Public Roads). Abstracts of a number of these papers will appear in later issues.

Reorganization of Committee System

Prayerful consideration given by the Executive Committee during the year to a general realignment of the society's work resulted in two minor items of improvement made known at the meeting: the centralization of study of testing methods in a new representative committee on Methods of Testing; and the similar centralization of work on nomenclature and definitions. Both subjects have given rise to rapidly increasing confusion during recent years, as different technical committees took divergent views of the same detail of test procedure, terminology or definition. No real work has yet been done by either committee, but both have formidable programs ahead of them for the coming year.

Publication of a quartely bulletin of the society was decided upon some months ago. The purpose is mainly to post the membership more fully and promptly on work in progress, specifically the work of specification committees.

New Officers

Charles D. Young (Pennsylvania R.R.) was elected president of the society for the coming year, G. Aertsen vice-president, and F. R. Baxter, E. D. Boyer, F. M. Farmer and W. H. Fulwiler members of the executive committee.

An attendance of over 700 was registered, only 28 less than the record attendance of 1920.

New Facts About Materials and Tests

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significant results of the tests was to bring out the importance of curing concrete for a time in a moist condition. The quality of fine or coarse aggregate produced less effect on wear than is commonly supposed. The wear was materially reduced by increased mixing. The wear of concrete was not sensibly increased by the use of hydrated lime or other admixtures used in the tests up to 20 per cent of the volume of cement. Wear was reduced with the age of concrete.

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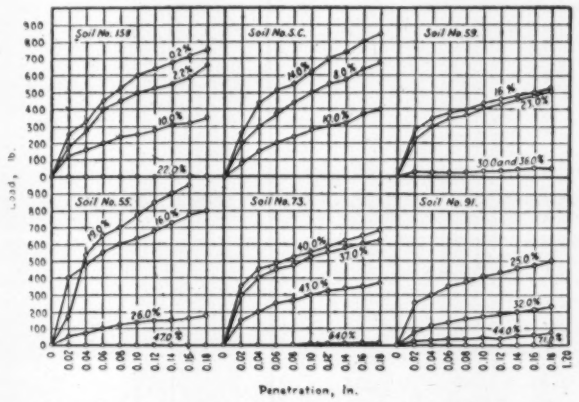

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Usually such tests are made after initial compression of the sample at 30 lb. per sq.in. and 50 lb. per sq.in., and for four different moisture contents (1) minimum necessary for kneading, (2) moisture equivalent, (3) the moisture determined by vertical capillarity, and (4) the maximum amount that can be worked into the soil. These four percentages of moisture are represented in the curves herewith reproduced, covering six different soils.

The bearing power under moisture equivalent has appeared to be most significant in the tests made up to now. Varying the moisture percentage up to this point affects the bearing power but little, in all soils, but beyond this point the bearing power decreases rapidly.

An approximate relation exists between moisture equivalent and mechanical analysis of a soil, but some other factors also enter. The moisture equivalent in general increases with the percentage of very fine silt and clay; it is interpreted as a measure of the retentiveness of the soil.

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Committee C-9 on Concrete and Concrete Aggregates outlined in its report certain facts regarding the testing and the proportioning of concrete which it has brought out through an extensive set of tests in various laboratories.

The cylindrical shape was found to be the best for concrete specimens.

A specimen having a height twice the diameter was selected. Shorter specimens, particularly below a ratio of 1½ to 1, showed great change in strength with slight change in relative height. Beyond the 2 to 1 ratio, that is for longer specimens like columns, the difference in strength was but slight.

The size of cylinder, 6 x 12 in., was recommended in 1914 when the maximum size stone was not greater than 1½ in., that is, one-fourth the diameter of the specimen. For larger stone, cylinders 8 x 16 in. were recommended, in general requiring the diameter of the cylinder to be at least four times the size of the largest stone particles; and for concrete aggregates of small size 4 x 8 in. cylinders were permissible. The advantages of the 6 x 12-in. cylinders over the 8 x 16-in. for ordinary uses are the lighter weight in handling on a job and the smaller quantities of material required in laboratory tests. Tests made under the auspices of the committee showed that within the limitations indicated the size of the specimen has practically no effect upon the strength provided the ratio of height to diameter is the same.

If tests are made on specimens having other ratios of height to diameter than 2 to 1, correction must be made for this difference in shape of specimen. With cubes or cylinders having a height equal to the diameter, it was found that the strength of the standard cylinder would be approximated by multiplying the cube strength by 0.73. Specimens with a height one-half the diameter, were 50 per cent stronger than the cube. To convert the strength to standard cylinder the strength of the half-cube must be multiplied by 0.48.

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in this field is still uncompleted. Fabric testing machines are under study.

Tile, Brick and Refractories—Less rapid progress was indicated in these fields than in most of the others, but the study of the relation between density and fire resistance that has been begun by the Building Tile committee represents an investigation of advanced purpose. One of the present conclusions is reflected in the abandonment of the absorption test for tile. In brick, a specification for clay sewer brick was reported. The Refractories committee presented a test for spalling action of fireclay brick.

Insulating Materials—A test for mechanical strength of electrical porcelain was a feature of the committee work in this field. Other work dealt with transformer oil and insulating varnish testing. Separate work in the same field by the Rubber Products committee produced specifications for linemen's gloves, cable insulation and the like.

Technical Papers

Of the twenty-five papers presented, the following not previously mentioned are cited: "Secondary Reference Standards in Process Problems of Color Measurement," by H. S. Busby; "Stress-Strain Measurements on Paint Films," by H. A. Nelson (New Jersey Zinc Co.); "Plastic Flow Through Capillary Tubes," by E. Buckingham (Bureau of Standards); "Improvements in Apparatus for Testing Petroleum Products," by T. G. Delbridge (Atlantic Refining Co.); "Some Mechanical Properties of Hot-Rolled Monel Metal," by P. D. Merica, R. G. Waltenberg and A. S. McCabe; "Magnetic Spring Testing," by T. Spooner and I. F. Kinnard; "Impact Tests on Cast Steel," by F. C. Langenberg (Watertown Arsenal); "Comparative Tests on Steels at High Temperatures," by R. S. McPherran; "A Test for Shock Strength of Hardened Steel," by C. E. Margerum; "Tests of Soils with Relation to Their Use in the Subgrade of Highways," by A. T. Goldbeck and F. H. Jackson (Bureau of Public Roads); "Measurement of Impact of Motor Trucks on Roads," by E. B. Smith (Bureau of Public Roads). Abstracts of a number of these papers will appear in later issues.

Reorganization of Committee System

Prayerful consideration given by the Executive Committee during the year to a general realignment of the society's work resulted in two minor items of improvement made known at the meeting: the centralization of study of testing methods in a new representative committee on Methods of Testing; and the similar centralization of work on nomenclature and definitions. Both subjects have given rise to rapidly increasing confusion during recent years, as different technical committees took divergent views of the same detail of test procedure, terminology or definition. No real work has yet been done by either committee, but both have formidable programs ahead of them for the coming year.

Publication of a quartely bulletin of the society was decided upon some months ago. The purpose is mainly to post the membership more fully and promptly on work in progress, specifically the work of specification committees.

New Officers

Charles D. Young (Pennsylvania R.R.) was elected president of the society for the coming year, G. Aertsen vice-president, and F. R. Baxter, E. D. Boyer, F. M. Farmer and W. H. Fulwiler members of the executive committee.

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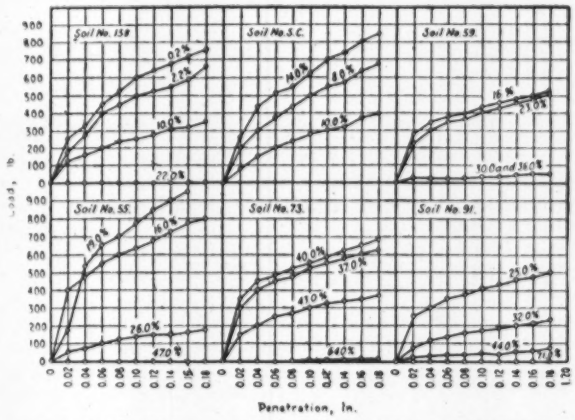

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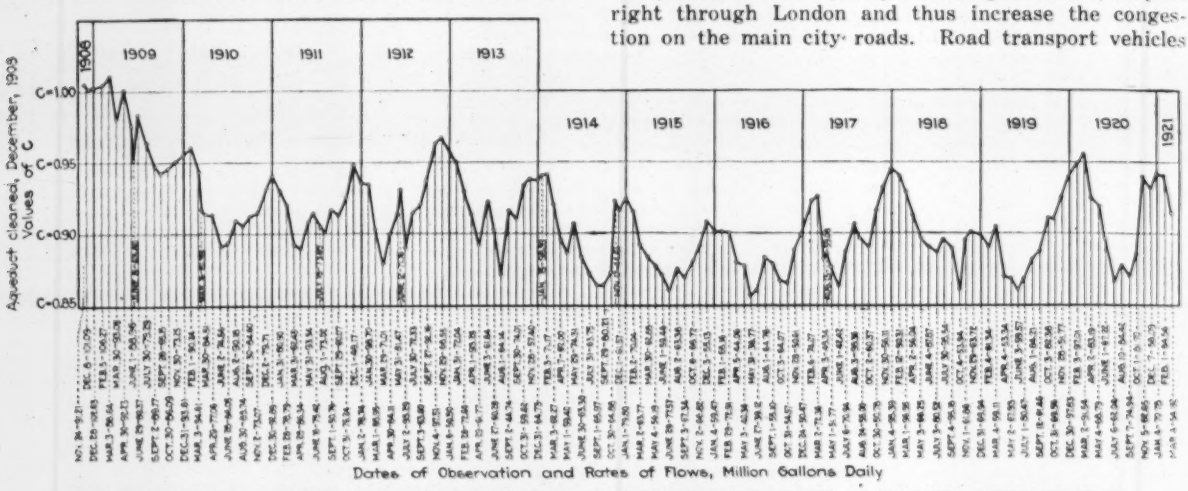
Changes in Cleanness Coefficient of Sudbury River Aqueduct

By Frederic I. Winslow
Division Engineer, Metropolitan Water Supply, Framingham, Mass.

MONTHLY changes in the coefficient of cleanness of the Sudbury River Aqueduct of the Metropolitan water supply for some 13 years past are shown by the accompanying diagram.

The basic formula used in making up the tables for the flow in the Sudbury aqueduct, as given by A. Fteley in "Additional Water Supply" (Boston 1882) is $V = 127R^{.63}I^{.5}$. This formula, in which I indicates sine of inclination, applies when the aqueduct is moderately clean. As a check, current meter measurements are made once a month and the correction thus derived is employed until the next reading of the current meter. The term "coefficient of cleanness is used to denote the percentage that the meter reading is of the value given by the formula quoted above.



VARIATIONS IN THE COEFFICIENT OF CLEANNESS OF THE SUDBURY RIVER AQUEDUCT, METROPOLITAN WATER SUPPLY, MASSACHUSETTS

Based on current meter observations of flow taken once a month since latest cleaning of the aqueduct in December, 1908. Measurements made at Station 59 and compared with tabular flows as measured at Station 0 + 49. All measurements made are platted. The aqueduct was built in 1875. It is of brick, of horseshoe section, 7.58 ft. high and 9 ft. wide. The daily flow ranges from 50 to 100 million gallons.

About the only deduction to be made from the curve is that the coefficient is at its maximum some time in the winter and at the minimum some time in the summer, and varies from 86 to 109 per cent, the latter figure having been observed directly after the conduit had been cleaned. The diagram also shows a gradual lowering of the coefficient as the years pass, due probably to the growth of vegetation along the sides of the conduit. This growth, while being partly checked as winter approaches, probably still adheres to the sides of the conduit until spring, when the growth of plant life due to warm weather increases.

It would be interesting to know the effect on the coefficient of a longer or shorter period of flow, as the amount of water sent through the conduit is frequently changed, sometimes as often as once in 24 hours, while at other times it is the same for six days or more.

William E. Foss is director and chief engineer of the Water Division, Metropolitan District Commission, and Frank S. Hart is superintendent of the Sudbury Division.

Attitude of British Toward Concrete Road Construction

(London Correspondence)

THE attitude in Great Britain toward concrete roads is one of increasing interest. Two paving outfits have been supplied by the Allied Machinery Corporation to the Middlesex County Council for use on the new north circular road. This road, beginning at the west side of London, in the suburb of Ealing, is to pass through Willesden, Edmonton, skirting the northern and northeastern districts, and making again for the Thames on the east side of London, terminating at Southend on the river. This road will relieve the heavy traffic which has, by lack of good roads, to pass right through London and thus increase the congestion on the main city roads. Road transport vehicles will, then, use this road when proceeding from the west of London to the east.

The entire road will be built half-width, i.e., 24 ft. at first. The new north circular road was undertaken also to relieve the prevailing unemployment, the government paying one-half the cost and the Middlesex County Council the other half.

Another complete paving outfit has been supplied to the Northumberland County Council, which is rebuilding with concrete a 3-mile stretch of the great north road between Newcastle-upon-Tyne and Morpeth. This road is also being built one half at a time, a width of 14 ft., as the present traffic over it could not be diverted. The full labor-saving outfit was not used, owing to the unemployment, but the road was laid, levelled and finished mechanically, 13 men laying 180 cu.yd. of concrete per day. Eleven of the 13 men were unskilled workmen.

The other pavers used for road work were supplied to the Marylebone Borough Council for laying foundations for wood paving in Oxford Street which, at present, carries the major part of the traffic proceeding across the north side of London.

Concrete roads in Britain are, so to speak, on trial, and should the new north circular road, especially, prove a success, there is no doubt but that the use of concrete for the main highways will rapidly extend.

LETTERS TO THE EDITOR

If you have ideas that would interest engineers and contractors we shall be glad to give them space here. We urge, however, that you be brief so that a wide range of subjects may be covered in the available space.—The Editor.

A Siamese Dredging Record

Sir — The following dredging record may interest your readers.

A 2½-yd. all-steel dipper dredge designed by the writer has been working in Siam on irrigation work, and has made a record of 1,115,000 cu.yd. in 2 years and 9 months without stoppage for repairs of any sort except the renewal of wire ropes.

The cost of labor, fuel, stores and repairs, but not including interest, depreciation or supervision, was 4.8c. per yd.

This output is not remarkable in itself, except having been made in a tropical country remote from base of repairs, and in freedom from breakdowns and repairs.

The dredge is fitted with Robinson's patent solid laminated dipper arm and duplex parallel hoisting ropes. The hoisting ropes run one year without renewal, and the dipper arm has never been taken out of the saddle-block and is apparently as good as new, nor has a shaft been lifted in three years. Working single shift 9 hours; material, clay; deposit on bank.

This dredge is in line with the recommendations made by the writer in a recent paper read before the American Society of Civil Engineers advocating better dredges that would not break down, and is an answer to the criticism that it cannot be done. A. W. ROBINSON.

Hongkong, China, May 4.

Design Considerations in Mixed Steel nd Concrete Construction

Sir—In regard to the letter of R. E. W. Haggerty, in *Engineering News-Record*, May 12, 1921, relative to so-called mixed construction, it is interesting to note the peculiar failure to which he refers as the basis of his conclusions, in questioning the propriety of using structural steel and reinforced concrete on the same job.

It is common practice to use a straight line instead of a parabolic stress deformation curve in concrete, also to ignore the fact that the modulus of elasticity of concrete generally increases with age, and with this increase comes a change in the position of the neutral axis, which affects the lever arm to a smaller extent. Assumptions as to the width of slab to be considered as part of the compression flange of T-beams, are in general practice, of a conservative nature. Tests show that concentrated loads placed in midspan of one-way reinforced panels, not to mention multiple-way, are so distributed in effect that instead of very high local values, we get lesser values spread laterally over a much wider zone than the area actually loaded. In addition, we have at times, arching, also to a limited extent, tension in concrete, not to mention benefits accruing from the monolithic nature of reinforced-concrete construction as generally used.

Treating all the above effects as being on the safe side, and acting cumulatively however, would hardly justify the most ardent advocate of reinforced concrete to believe it possible for a 7-story building to stand after the failure of two important first-floor columns, without even developing cracks around said columns. Concrete is only able to follow the steel in tension for small values, before it cracks. This frequently occurs at from 3,000 to 6,000 lb. on the steel, and the cracks become visible ordinarily to the careful observer, at from 10,000 to 16,000 lb. steel stress. A sudden application of load, such as one would expect from a column failure, accentuates this condition. This, in view of the uncracked condition reported, tends to make the resisting power of the failure quoted the more remarkable.

A more detailed report of the failed structure would be very interesting, not necessarily to act as a precedent or excuse for less conservative design, but to illustrate to what extent a kind Providence at times, does, apparently, stay the law of gravitation. This undoubtedly is the real point Mr. Haggerty had in mind, rather than laying stress on the lack of effectiveness of subsequent repairs.

As to the references made to the so-called mixed construction, in referring to the United States Bank Bldg. at Denver, described by Mr. Wheeler in a previous issue, it must be admitted that while reinforced-concrete buildings are generally constructed so that the concrete frame gets the load direct, it is likewise general practice in steel buildings, to use some other material, frequently concrete, to carry floor loads to the steelwork. Steel beams are frequently used to carry loads to supports of various materials, and surely load can be transmitted to structural steel by concrete members. In the practice of engineering, it is constantly necessary to make use of different combinations of different materials, each of which has its own distinct physical properties. Among these combinations, is that of structural steel and reinforced concrete which can be successfully used jointly in the hands of competent designers, and such was the case in the Denver building above referrd to. V. D. FIXEN.

Chicago, Ill., June 12.

How Strong Should a Dam Be?—Reduced Factors of Safety Commonly Used

Sir—The editorial entitled "How Strong Should a Dam Be?" in your issue of June 16, p. 1017, recalled to me forcibly the amazement I have always felt at the methods of handling factors of safety in engineering design. The point I desire to make is this: While a bridge, building or other structure will be designed so that all its component parts will have a factor of safety of four and sometimes six in resisting stresses due to *maximum loads* to be imposed on them, dams and other retaining structures, in fact the very foundations on which these bridges or other structures depend for their stability, are designed with much reduced factors of safety.

For instance, retaining structures are designed first, against overturning with either the limitation that the resultant be inside of the "middle third" or that the toe pressure be within the allowable maximum soil pressure. In the first case, with the center of gravity of the vertical load resisting overturning considerably removed from the center of base a resultant at the edge of the middle third provides a factor of safety rarely of more than two and often less. For the condition of maximum soil pressure, the assumptions are made that various soils will support loads of certain amounts per square foot which allow a factor of safety of about two as far as load bearing is concerned and of considerably less than one as far as settlement is concerned, unless rock foundations are available on the site.

In designing these structures against sliding the provision generally made is that the horizontal thrust be no greater than one-half the vertical weight-resisting movement, which again provides a scant factor of safety.

The remarkable part of this condition is that retaining structures for either earth or water are more likely to be subjected to overload than are other structures. A retaining wall may have its retained contents soaked with water, which, by its additional weight and the reduction of the "angle of repose" may cause considerable increase in the horizontal thrust; again it may be subject either to a surcharge, or if already surcharged to an increase in surcharge, a condition which rapidly cuts into the factor safety.

In the case of dams the danger lies of course in flood action, and in the wave action which becomes quite a factor in high winds.

The matter resolves itself into a consideration of dollars and cents, and the expenditure of a greater amount of these is the only remedy. Foundations are a costly part of most work. M. HIRSCHTHAL.

Hoboken, N. J., June 18.

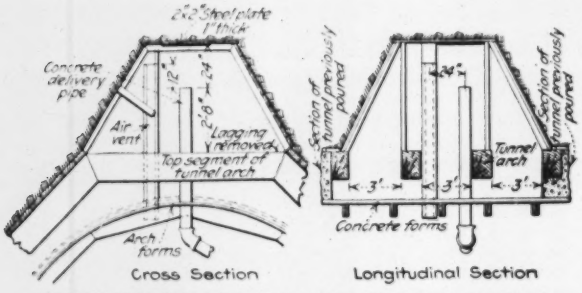
HINTS FOR THE CONTRACTOR

Careful Maintenance Reduces Mixer Delays

MIXER delays were largely eliminated in building the Butte-Anaconda concrete road in Montana by the following procedure: When the work stopped at noon and at night a number of 2-in. cast-iron balls were placed in the drum and the mixer operated for a minute or so. The balls loosened the concrete adhering to the inside and a stream of water washed out the loosened particles. Each morning before work was started the mixer was thoroughly gone over and each evening all repairs necessary were made. The mixer engineer came onto the work an hour ahead of time and remained overtime to overhaul and make repairs. During the season's operation the mixer was never shut down more than 30 min. at a time and lost time because of mixer troubles was negligible. Clifton, Applegate & Toole, Anaconda, Mont., were the contractors, with J. M. Hicks as superintendent.

Air Vent in Form for Tunnel Lining

Concrete lining in the San Fernando tunnel of the Southern Pacific Railroad is being placed by the pneumatic method, and due to the practice of lining sections in heavy ground first, it is occasionally necessary to make a closure or place concrete in a section between two adjoining sections that have already been lined. In these cases the concrete pipe enters the arch vertically from below and as the form is closed tight to prevent cement leakage, some outlet must be provided for the escape of the air used to blow the concrete in.



ARRANGEMENT OF VENT AND DELIVERY PIPE IN CLOSING SECTION

The arrangement of forms and delivery pipe in such a section has been worked out as follows:

Before placing the reinforcing steel in the closing section an excavation of 4 or 5 ft. more than the usual amount is made above the crown of the arch and in the top of this excavation a steel plate is fastened to serve as a buffer against which to blow the concrete. An air outlet is provided in the form of a vertical shaft or box made of 2 x 8-in. timbers (the box having an inside cross-section of 4 x 8 in.) extending to a height of 1 ft. above the top of the concrete delivery pipe.

For filling the wall forms and the lower parts of the arch, the delivery pipe is directed to the sides, as usual. After the concrete has filled the forms well up toward the center of the arch the last curve in the delivery pipe is removed and the concrete is delivered against the steel plate above. Delivery is continued in this direction until concrete overflows through the air vent. The last section of the 6-in. pipe through which the concrete was delivered is left in place until the concrete has set and is then cut off at arch level with a chisel.

A "Home-Made" Foot Brake for Muck Cars

In enlarging the section of Southern Pacific tunnels on the Tehachapi grade in California, muck is brought out of the tunnels in ½-cu.yd. dump cars. The cars are taken upgrade (2.2 per cent) by hand and when filled are allowed to roll out of the tunnel by gravity, the operator riding on the car and controlling its speed by means of a foot brake.

Ordinary half-yard dump cars were adapted for this service by the attachment of a foot brake consisting

FOOT BRAKE MADE OF PIPE ON MUCK CAR

of a 3-ft. length of old iron pipe fastened at one end to the frame of the car between the two wheels, the other end of the pipe extending to the rear and projecting below the body of the car so the operator can readily press on it with his foot when standing on the car frame. With the pipe bearing on the tread of the wheel, it was found that the operator could control the speed of the car within the desired limit.

Dynamite for Drainage Ditching

To form a ditch 1,500 ft. long for draining 20 acres of swampy land near Millen, Ga., sticks of dynamite were placed in holes 24 in. deep with an average spacing of 12 in. The resulting ditch was about 7½ ft. wide on top, 2½ ft. at bottom and 3½ ft. deep, the material removed being approximately 970 cu.yd. No hand trimming was required. With 1,000 lb. of dynamite at 25½c., 44 man-hours at 20c., and $6.20 for incidentals, the total cost was $270, or a unit cost of 27.8c. per yd. and 18c. per lin.ft. Blowing out ing would have cost 40 to 50c. per lin.ft., according to a report in the Georgia *Public Health Reports*. stumps represented 25 per cent of the cost. Hand ditch-

NEWS OF THE WEEK

New York, June 30, 1921

Ready to Pour Concrete at Hetch Hetchy Dam

After 20 Months of Work Foundation Excavation Is Completed to 85-Ft. Depth

After 20 months of continuous work excavation for the foundation of the Hetch Hetchy dam has been practically completed, and will be ready for pouring concrete early in July. When concreting starts it is hoped to pour at the rate of 1,000 cu.yd. per day. The maximum depth of bedrock, which was uncovered over the entire area on which concrete is to be poured, is 85 ft. below the bed of the stream with the exception of a few potholes which reach a depth of approximately 100 ft. in some places.

By the successful unwatering of the lowest excavation without caissons, which were at first considered, it is believed that the work has been so expedited that the structure can be carried above the danger line of next season's flood before the high water arrives. The Utah Construction Co., which has the contract for the construction of the dam, had considered the advisability of flooding the excavation for a while during the extreme high water period to avoid a possible mishap due to scour on the inner slopes of the excavation. As the work progressed, however, the excavation was kept dry so successfully that it was decided not to flood it, thus saving considerable time.

Flood Flow

The discharge capacity of the diversion tunnel, 23 x 25 ft. in cross-section, had been carefully computed, taking into consideration the crest elevation of the upstream diverting dam and the downstream back-water dam. Provision was made for taking care of 13,000 sec.-ft., which was the maximum flow measured in previous peak floods

The peak flow occurred on June 12, when it was estimated that 11,000 sec.-ft. was carried through the diversion tunnel. The actual runoff was in excess of this, it is believed, as there is a considerable amount of storage developed by this diversion dam on the valley above and which was effective in smoothing out the peak. Under this condition of maximum stream flow the water level was 4 ft. below the crest of the diversion dam or 136 ft. above the bottom of the excavation. The leakage into the excavation was successfully handled by the pumping equipment installed. This consists of one 14-in., one 8-in. and three 6-in. centrifugal pumps. A 12-in. pump held in reserve was not used.

New Southwark Bridge Opened

On June 6 the new Southwark bridge over the Thames, at London, was formally opened. The new structure replaces what was the largest and one of the earliest cast-iron arch bridges in existence. Steel arches have replaced the cast-iron work; their spans vary from 123 to 140½ ft. clear. The bridge is 55 ft. wide. Sir William Arrol & Co., Glasgow, were contractors. Traffic was handled on temporary footbridges during the reconstruction.

Oil Insulation of Subgrades Used in California Experiments

The California State Highway Commission is carrying on with the approval of the U. S. Bureau of Roads extensive experiments in an effort to overcome the effects of adobe and alkaline soil upon the state highway pavements. The experiments on the road between Mojave and Lancaster in Kern and Los Angeles counties include the treatment of the subgrade or earth foundation under the concrete slab by the oil penetration method with a view of insulating the concrete from the alkali in the soil. On another section of the highway, the commission's engineers are placing a 4-in. cushion of gravel over the adobe subgrade. Similiar experiments are being conducted west of Lemoore in Kings County.

A modern theory of highway construction, the commission explains in a recent statement, is that permanency of concrete road slabs depends largely upon the subgrade—if the subgrade is adequate and there is no separation between it and the concrete slab, the massive concrete slab is not necessary. Experiments conducted by the U. S. Bureau of Roads are cited to indicate that much money may be wasted in constructing heavy concrete slabs. If permanency of the earth foundation can be obtained, heavy traffic may be maintained upon comparatively thin concrete roads. The California experiments are being conducted upon federal-aid projects.

Experimental reconstruction is to be undertaken by the state highway commission engineers upon some portions of the county-built oil-macadam highways in San Joaquin County north of Tracy by the installation of concrete shoulders on each side of the present paved road. The shoulders will be 30 in. wide and approximately 8 in. thick.

The roadway between the shoulders, after scarifying and rerolling, is to be resurfaced with mixed asphaltic concrete to an approximate thickness of 2½ in. The commission will spend not more than $20,000 on this experiment.

Committee Reports on N. Y. Waste Disposal

Recommendations Favor Municipal as Against Contract Work—Reclamation Stations Suggested—Program Outlined

Municipal instead of contract collection and disposal of wastes and establishment of reclamation stations where rubbish will be burned in furnaces are among recommendations submitted to the Mayor of New York in a report on the collection and disposal of solid wastes by a committee headed by Chief John Kenlon, of the Fire Department, and including Edward A. Byrne, Royal S. Copeland, Philip P. Farley, L. F. Haffen, Murray Hulbert, John P. Leo, Merritt H. Smith, Amos Schaeffer, and Arthur S. Tuttle. It is recommended by the foregoing committee that the following program be adopted for the disposal of New York's solid wastes:

1. That the city ordinances and the rules and regulations of the street cleaning and health departments requiring separation of all wastes by the householder be rigidly enforced.

2. That collection of ashes, rubbish, garbage and street sweepings be made separately.

3. That as soon as practicable the collection and final disposition of all wastes be made directly by the city without the intervention of contractors.

4. That ashes entirely free from rubbish, from street sweepings and from garbage be used for filling low lands and that, wherever possible, city owned lands be used for this purpose, and that the necessary legislation to permit of this be obtained.

Reclamation Stations Recommended

5. That reclamation stations be established at suitable locations where the more valuable materials may be picked out of the rubbish and the residue burned in furnaces operated at a sufficiently high temperature to prevent possible nuisance.

6. That all street sweepings be burned at the reclamation stations.

7. That garbage be taken to sea until experiments now under way can be completed.

8. That in case the experiments now in progress are unsatisfactry, or the processes be found too costly, the city should adopt some other method of final disposition of garbage.

9. That a reduction plant for the final disposal of dead animals and offal be immediately constructed.

10. That a special study be made by the street cleaning department of the problem of collection and transportation of all kinds of waste to reduce costs.

11. That the question of transportation by water and waterfront dumps be given similar study so as to develop a type of scow which will permit the economical filling of low lands as recommended.

12. That property be selected and acquired, where not already owned, at suitable locations for the purpose of constructing waterfront dumps or inland transfer stations so as not to be dependent on contractors.

13. That the city adopt the foregoing program as its general policy and proceed to work out the details as fast as the means at its disposal will permit.

14. That the street cleaning commissioner be authorized to secure the services of men equipped by training and experience to prepare detailed working plans and estimates of cost for all necessary equipment and plant to carry out this program.

15. That any immediate expenditures be confined to the purchase of motor trailer and floating equipment, to the purchase of sites and the construction of waterfront and inland reclamation stations; and reduction works for dead animals and offal.

The city waste disposal commitee explains that its report is incomplete as to the final disposition of garbage as well as with respect to the development of the remainder of the plan, but desires to state that it will hold itself in readiness to confer with the commissioner of street cleaning from time to time during the preparation of the final plans by the experts to be employed, and to review and report upon these plans, to the end that they may be harmonized with the general procedure herein outlined.

Surveys on Columbia Basin

Further examination and study of data compiled in connection with surveys of the Columbia Basin project in the state of Washington are being continued, including diamond drilling at a proposed dam site on the Columbia River. The project, proposing the irrigation of 1,753,000 acres, was described in *Engineering News-Record*, Nov. 11, 1920, p. 944. The designs and cost estimates on the entire project are being revised and it is expected that the later figures will place the total cost well below the $300,000 which was calculated at the peak of 1920 prices.

Ten Per Cent Rate Reduction on Eastern Canadian Lines

A reduction of 10 per cent in rates on the railroads of eastern Canada has been ordered by the Dominion Board of Railway Commissioners. Western rates will remain unchanged. This reduction establishes a return to the rates prevailing before Sept. 1, 1920, when a 20-per cent increase was granted with the understanding that rates would be reduced 10 per cent Jan. 1, 1921, and 10 per cent July 1, 1921.

Pennsylvania R.R. to Tear Down Old Trainshed

Announcement has been made by the Pennsylvania R.R. of its intention to begin work early in July tearing down the trainshed of its old passenger terminal in Jersey City. It will be replaced by a low shed of the longitudinal smoke-duct type.

Construction of the old shed was begun in 1890 and when it was completed was the largest high arch passenger trainshed in the country. Since the opening of the New York passenger terminal of the Pennsylvania R.R., the old Jersey City terminal has been used almost entirely to handle suburban traffic transferring to the ferries and the Hudson tunnels. The contract for removing the old shed has been let to Henry A. Hitner's Sons Co., contractors, Philadelphia.

Discuss Location of New Viaduct for Atlanta, Ga.

The location of a roadway viaduct across railroad tracks in the heart of the city at Atlanta, Ga., is under discussion between C. E. Kauffman, city engineer of bridges and estimates, and the chief engineers of the railroads. The city has reported in favor of a viaduct at Spring St. and engineers representing the railroads have submitted a report recommending that the northerly terminus of the viaduct be Cone St. It is stated that this location would permit the viaduct to cross the railroad tracks in a direction more nearly at right angles.

In March, 1921, the City of Atlanta approved at a special election a bond issue of $750,000 for the construction of a viaduct across the railroad tracks in the heart of the city with its northerly terminus at Spring St. This viaduct is needed to relieve traffic congestion in the heart of the business district by providing a through route bypassing the congested area on its westerly side. One of the plans for the Spring St. viaduct submitted by the city necessitates the crossing of railroad tracks for a distance of about 1,200 ft. The location recommended by H. L. Collier, chief of construction, and C. E. Kauffman, engineer of bridges and estimates, and tentatively approved by the city planning commission, reduces the distance the viaduct will extend over the railroad tracks by about 50 per cent.

Robert H. Whitten, consultant to the planning commission, submitted a report on viaducts in the congested section, recommending that the present viaduct be constructed to Spring St. but that the Cone st. route be left open for the construction of a future viaduct. He stated that the present traffic requirements also demand the elimination of the grade crossings at Prior St. and Central Ave. through the construction of viaducts. C. E. Kauffman is now taking up with the engineers for the railroads the details of the location of the Spring St. viaduct.

To Use Canal Bed for Highway

The application of Ira and Boston, two surburbs of Akron, Ohio, to utilize the Ohio Canal bed as a boulevard entrance into the city so as to avoid the necessity of climbing out of the steep Cuyahoga River Valley has been authorized by legislation. The bill also provides for the use of the canal bed as a right-of-way for a sewer. The county commissioners assume responsibility for flood damage, must build and maintain culverts, and must commence work within a reasonable time.

Commission Approves Report on Philadelphia-Camden Bridge

On June 23 the Delaware River Bridge Commission, composed of the interstate bridge commissions of Pennsylvania and New Jersey, approved the recommendations made by the board of engineers on June 9, fully abstracted in *Engineering News-Record* of June 23, p. 1086. The commission adopted the Franklin Square location, as against the Spring Garden St. and Washington Square locations that continued to be advocated by various interests in the public hearings preceding the commission's decision. It also approved the adoption of the suspension bridge design, and continued the enginering organization of the board of engineers for the immediate preparation of contract plans.

Action by the city council of Philadelphia on the necessary appropriation of money for construction has been deferred. This appropriation is necessary to legalize further steps in construction. The two states have appropriated sums to cover their contributions to the cost of the bridge, but they are contingent on the city's appropriation being made. It is generally expected that council will act favorably within the next few weeks.

Contract plans for the foundation work may be completed by fall, ready for calling for bids on this part of the work. The necessary surveys for the condemnation or purchase of lands required for the bridge have already been begun.

Kansas City to Meter Water

All new water service connections will be metered at Kansas City, Kan., and meters will be installed as rapidly as possible on old connections.

Governors Would Discuss Waterway and Power Development

Following the suggestion of Governor Sproul of Pennsylvania, Governor Edwards of New Jersey has subscribed to the proposal for a joint conference among the Governors of New York, Pennsylvania, and New Jersey for the development and utilization of rivers and streams in the two states. It is proposed to initiate joint discussions of flood control, water power development and the general economic importance of the rivers of the three states.

Phipps Road Bill Passes House

The Phipps highway bill, with the Dowell bill added, passed the House of Representatives June 27 by a vote of 266 to 77. The action was taken under suspension of the rules which precluded any amendments on the floor of the House. An effort was made by the opponents of the legislation to force the bill to a vote without debate. Finally, however, it was arranged that each side was to be allowed twenty minutes to be used in arguments for or against the measure. The debate was very acrimonious, despite the time limitation.

Senator Townsend stated on June 27 that he would move the following day to refer the bill as it passed the House to his committee. If his motion should be lost the measure then necessarily will go immediately to conference. The vote on the Townsend motion, however, will not be a test of strength as it is probable that some senators who favor the Dowell principles would be unwilling to have such important legislation go to conference without the Senate having had an opportunity to consider it. After the Senate has had a chance to debate the Townsend bill, it then will be possible to move at any time to substitute the House bill and pass it.

While there is no certainty that a federal highway commission will be set up, there already is speculation as to whom the President might chose for such a commission, if by any chance it were authorized. These names include those of George Deihl of Buffalo, president of the American Automobile Association, Samuel M. Williams, of the Highway Industries Association, and Roy Chapin, of the Hudson Motor Car Co.

Federal Reclassification Report

The Federal Council, representing government employees who are members of the American Association of Engineers, has recently submitted to the Joint Congressional Committee which has the subject under consideration, a report on various reclassification bills now pending at Washington, D. C., especially with regard to the status of technical and scientific employees. The report is accompanied by a chart illustrating the salary curves of the various bills pertaining to the technical and scientific groups of the federal service.

It is not feasible to attract young men into the service, the report states, at a salary less than the minimum shown on the A. A. E. curve. It is held necessary to make a sufficient range in the sub-professional grades to create an incentive to these employees, many of whom would be ineligible to enter the full professional grade without years of experience. In positions carrying yearly salaries of $1,800, it is pointed out, are included the bulk of the professional and scientific personnel. A wider range of salaries in this grade is urged. The A. A. E. curve provides for this condition by extending the upper limit to $2,760, embracing four movies within the grade at intervals of $240 each.

The Federal Council believes that any bill concerning reclassification should contain provision for an executive agency under the control of the President to harmonize all questions regarding allocations and which should function as a board of appeal for employees.

Bill for Regulating London Traffic

The new bill introduced in Parliament by London members for the better regulation of traffic has for its object the improvement of the Home Office by-laws. These by-laws will be drafted by a committee composed of a representative each from the London County Council, the borough councils, Greater London, the London members of Parliament and the Ministry of Transport. The by-laws will deal chiefly with the position in the streets of slow- and fast-moving traffic, with the regulation of certain classes of traffic to specific thoroughfares; with frontage obstruction by the loading and stationing of vehicles; with the parking of cars in squares, and with obstructions generally.

Urge Revision of Government's Employment Policy

A complete revision of the employment policy of the national government is recommended by the Chamber of Commerce of the United States. This action is taken as a result of a referendum vote on the subject just completed among the 1,400 business organizations within the chamber's membership. The chamber's position is that the recasting of the system is necessary as a means of obtaining efficiency in the government service. The recommendations are:

1. Recasting of the present system under which personnel for the federal civil service is secured and managed. 2. Adequate and uniform pay under essentially like conditions for the federal civil service through reclassification and regrading. 3. Reclassification by statute based upon investigations already made and further investigation by the U. S. Civil Service Commission. 4. Reclassification by the commission and the budget bureau and current correction made by Congress, aided by these agencies. 5. Promotion through statutory recognition as the preferred method for filling vacancies. 6. Inclusion of all administrative officers not responsible for determining policies under civil service rules. 7. Transfers between departments to be regulated by executive orders consistent with the civil service law. 8. Efficiency records to be developed by the civil service commission. 9. Removal of an employee to be possible upon a written statement of the reasons to the employee with opportunity for a written reply, but without right of appeal above the head of the department.

Deliver First 1,500-Ton Barge for New York Canal Service

The first of five barges with a cargo capacity each of 1,500 gross tons and 10-ft. draft has arrived at New York City, via the New York State Barge Canal, loaded with 83,000 bu. of oats. The five barges for operation on the canal have been ordered from the McDougall-Duluth Shipbuilding Co. of New York and Duluth. They are 254 ft. long, with 36-ft. beam and 14-ft. depth, having a cargo capacity of 1,500 gross tons at a 10-ft. draft and 1,750 gross tons at 11-ft. draft. They are driven by Diesel oil engines. A company is being organized to operate the barges and maintain a regular service between New York and Buffalo, largely devoted to the grain carrying business. Julius H. Barnes, formerly president, United States Food Administration Grain Corp., and Capt. A. Miller McDougall, of the shipbuilding company, are joint owners of the barges.

A £11,281,000 Water Loan Proposed for London, England

A bill authorizing the Metropolitan Water Board of London, England, to expend £11,281,000 during the next fifteen years for extensions to its works has been approved by a committee of the House of Commons and is now before a joint comittee of the Commons and Lords. The outstanding feature of the scheme is the enlargement of the Littleton Reservoir on the north side of London. This reservoir now holds 6½ billion Imperial gallons, or about 24 days' supply for London. By increasing the capacity of this reservoir, the western and northern areas can be supplied therefrom, while those supplies for the eastern area can be conserved for its own needs.

H. E Stilgoe, chief engineer to the Metropolitan Water Board, says that the London supply is at the rate of 39 Imp. gal. per head per day which is larger than that of any other city or town in England, and that he sees no way by which this rate can be reduced. If this scheme is carried through the available supply will be 42 Imp. gal. per head. Of the present consumption of 39 Imp. gal. a day, 9 gal. is for trade purposes. The consumption of other large cities in Britain is estimated at 22.8 Imp. gal. per head per day for Leeds, 22 for Birmingham, and 12.4 for Sheffield.

The bill is being opposed by the London Chamber of Commerce and by the Associated London Manufacturers' Committee. The Chamber urges against the bill the present high cost of labor and material and contends that by saving 1 Imp. gal. a day, which it says could be easily done, the scheme could be postponed a year. The Manufacturers' Committee opposes the bill because it would increase the water charges for trade purposes from the present 6½d. to 2s. per 1000 Imp. gallons or from about 11 to 39c. per 1000 U. S. gallons.

Filters for Milwaukee Now Are Urged in Report

Following laboratory experiments of chemists of the Milwaukee Sewerage Commission and a report of the local section of the American Chemical Society calling on the city of Milwaukee to delay water filter construction to await the outcome of impending discoveries in both water and sewage treatment, Harrison P. Eddy, consulting engineer of the firm of Metcalf & Eddy, of Boston, was called in to report on the need of filters. His report, presented June 6 to Mayor D. W. Hoan, indicates that filters should be built and the construction should not be delayed. Since it will take a year to perfect the designs, experiments on the effect of the accurate control of the electrically determined acidity (hydrogenion concentration) upon the process of coagulation and filtration can be obtained. If successful methods in the laboratory are found large-scale tests at the existing experimental plant should be made. If this experimental work demonstrates the desirability of adopting new methods, Mr. Eddy is of the opinion that the filter designs can be easily modified accordingly. He recommends placing the investigation under the joint direction of a recognized expert in colloidal chemistry and a water-works engineer.

California Commission Answers Automobile Association

Charges of wastefulness in day labor highway construction work, made by the California State Automobile Association in bulletins recently published, have been answered in a statement issued recently by the California Highway Commission, which claims that material and vital facts relating to the highway program have been deliberately concealed by the automobile interests. In a number of instances it is pointed out, the automobile association has quoted estimated costs on one type of road construction and final costs on an entirely different type, failing to note that the type of construction was changed.

Bids on nineteen contracts which exceeded the estimates have been rejected by the highway commission since August, 1915. These rejected bids, it is stated, exceeded the engineers' estimates by an average of 41.2 per cent. Twelve of these sections were later constructed by day labor. Of the 165 contracts for which bids have been received by the commission since 1915, only twelve have been constructed by day labor. It is charged by the commission that the automobile interests would have all work done by contract without regard to whether bids of contractors are resonable or excessively high.

By those familiar with local conditions the automobile association's attack on the highway commission's policy is belived to be losing favor with a considerable number of organizations and individuals, but some of the representatives of automobile manufacturers are considering the tentative organization of a campaign to declare war on the automobile association and withdraw support from it as long as it persists in what is characterized as a destructive policy with regard to the state highway program. The automobile association, it is realized, has gained strong following by reason of the active publicity campaign which it has conducted since the start of its attack on the highway commission.

Fix Date for Lyons Fair

The Lyons Fair, for the promotion of international trade, will be held in Lyons, France, Oct. 1-15. American manufacturers may secure further details from Emile Garden, 150 Nassau St., New York City.

New Haven Rejects and New London Adopts City Manager Plan

New London, Conn., voted 2,744 to 1,644 for a council-manager charter on June 6. A council of seven members, elected at large, will appoint a city manager, at a salary of $5,000 a year. The councilmen will receive $300 a year. Heretofore New London has been governed by a mayor and council for the city and a board of selectmen for the town, the three selectmen sitting as members of the City Council and bringing its membership to 18. At New Haven, on June 14, a city manager charter was defeated by a vote of 18,717 against, and 7,909 for, out of a possible 45,687 votes.

Defer British Registration Bill

The Institution of Civil Engineers of Great Britain has informed the council of the Institution of Municipal and County Engineers during the course of the year that it had been decided not to proceed with the proposed bill for the registration of engineers, but to substitute for it an application for an alteration in the charter to obtain the power of conferring the title "chartered engineer." In view of the increasing number of countries in which registration of engineers is becoming an accomplished fact the postponement of registration, according to the recently published annual report of the council of the municipal and county organizations, is to be regretted. The report says, in part:

"Registration is neccessary if the engineering profession as a whole is to attain the highest possible standard and if the public is to be guaranteed a regular standard of efficiency such as is already provided in the medical profession. Engineering work involves the safety, health and comfort of the whole community, but there is also the question of economy; true economy is always the result of the highest skill, and the money spent in improving engineering education training, which is returned a thousandfold, is largely wasted unless there is some provision for ensuring the utilization of the required knowledge.

To Rebuild South Street Bridge Over Schuylkill River

Plans are being made by the Department of Public Works, Bureau of Surveys, of Philadelphia for immediate reconstruction of the South St. bridge over the Schuylkill River. The present wrought-iron pin-connected drawbridge, operated by hand was built in 1878 and reinforced in 1895. A 576-ft. length of the present structure is to be replaced by five plate-girder spans, the central one to be a double-leaf trunnion bascule giving 100-ft. clear channel.

In contrast to other Schuylkill River bridges, the new structure has received special attention with regard to architecture. The design has received the approval of the Art Jury. The piers supporting the bascule leaves will be of massive concrete construction, surmonted by copper-covered houses for the operating machinery. Careful study has been given to the problem of concealing the machinery and counterweights, which render most bascule bridges unsightly.

Traffic will have to be interrupted during a large period of the reconstruction and diverted temporarily to the Gray's Ave. and Walnut St. bridges. To minimize the interruptions, however, the foundations (to rock) will be constructed as far as possible before closing the old structure. A temporary run-around bridge is out of the question at present prices.

Bids are now being asked for the removal of the old bridge and construction of the new foundations. It is anticipated by Charles Frommer, acting chief engineer of the department, that bids for the new superstructure can be called for within a few months.

During the period of construction of the new river bridge another contract will be let for the reconstruction of the old truss spans on South St. over the tracks of the Philadelphia, Baltimore & Washington R.R.

New Illinois Legislation

Bills passed by the Illinois legislature which adjourned June 18 include the following which have some bearing on engineering work:

The Sanitary District of Chicago may construct controlling works on the Great Lakes and may build garbage reduction plants. The Sanitary District or the city of Chicago may construct a deep-water harbor in Lake Calumet. City councils may create zoning commissions, and cities and villages of less than 5,000 may adopt the manager form of goverment. The bond issue of $20,000,000 for the Illinois waterway is approved The Illinois Commerce Commission is created to supersede the public utilities commission. The state highway act is revised; a patrol maintenance system is authorized, counties may bid on state road construction and the State is given power to construct material plants. A commission to promote the St. Lawrence waterway is authorized.

ENGINEERING SOCIETIES

Calendar

Annual Meetings

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION, University of Pittsburgh, Pittsburgh, Pa.; Annual Convention, New Haven, Conn., June 28-July 1.

The Grand Rapids Engineering Society recently appointed a committee to investigate and report on methods of improving gravel streets with permanent surface top. The committee, consisting of H. H. Turner, Purritt A. Parks, Byron E. Parks, Theodore O. Williams, John F. Nellist, C. A. Paige, A. H. Apted and C. J. Wagner, has recommended the use of sheet asphalt or a bituminous pentration top.

The Engineers' Society of Pennsylvania, at its annual meeting, June 13, at Harrisburg, elected the following officers: President, Richard V. McKay; first vice-president, Theodore E. Seelye; second vice-president, Crosby Tappan; secretary, Howard E. Moses; treasurer, Harry T. Neale.

The Portland (Ore.) Post, Society of American Military Engineers, at its annual meeting June 13, elected the following officers: President, F. S. Cook; vice-president, P. Hetherton; secretary, E. B. Thompson; treasurer, S. C. Schubert; assistant treasurer, A. D. Montieth.

The Engineering Society of Akron has elected the following officers: President, J. H. Vance; vice-president, L. G. Tighe; directors, R. R. Metheany and H. G. McGee. Mr. McGee is also secretary-treasurer.

PERSONAL NOTES

PROF. CHARLES A. ELLIS of the University of Illinois has resigned, effective at the end of the present school year, to become vice-president of the Strauss Bascule Bridge Co. of Chicago. He is a graduate of Wesleyan University, A.B. 1900. For two years he was assistant to the city engineer at Middletown, Conn. From 1902 to 1908 he was employed by the American Bridge Co. as draftsman checker, squad foreman, and designer on many large railway structures. From 1908 to 1912 he was assistant professor of civil engineering at the University of Michigan, and from 1912 to 1914 designing engineer for the Dominion Bridge Co. In 1914 he was made assistant professor of civil engineering at the University of Illinois and since 1915 has been professor in charge of all courses in bridge and structural engineering. He has been a constant contributor to the technical press, and is now completing the manuscript for a text book on framed structures which will go to press this autumn. He has recently been appointed one of the associate editors for a large and comprehensive library of hand books in structural engineering.

L. H. WHEATON, consulting engineer, Halifax, N. S., has been appointed commissioner for the County of Cape Breton, with headquarters at Sydney, B. C. He will make reports to the joint expenditure board in matters relating to public works and expenditure for the county.

COLONEL GEORGE M. HOFFMAN, Corps of Engineers, U. S. A., has been designated as a member of the board which is to prepare a detailed plan for marking American battlefields in Europe.

COLONEL GEORGE P. HOWELL, Corps of Engineers, U. S. A., has been appointed to the army retiring board for the Fourth Corps Area.

W. O. MCCLUSKEY, JR., has resigned as county road engineer, Ohio County, W. Va., to become assistant division engineer for the third district of the State Road Commission.

ALEXANDER G. HOFFMAN, assistant county road engineer, Ohio County, W. Va., has been appointed county road engineer, Ohio County.

COLONEL J. A. WOODRUFF has been designated as senior instructor of the Engineer Reserve Officers Training Corps class assembled at Camp Humphreys, Va., near Washington, from June 16 to July 27. The camp will be organized into a battalion of four companies.

E. R. RODENBERG, for ten years assistant city engineer of East St. Louis, Ill., has been appointed chief engineer of the East Side Levee and Sanitary District, East St. Louis, Ill.

THE NATIONAL ENGINEERING CO. has been organized by I. Muschel, formerly inspector of construction, Navy stations, Pensacola, Fla., and Norfolk, Va., to specialize in the design, erection and construction of structural steel and reinforced concrete buildings.

B. M. HALL, of B. M. Hall & Sons, engineers, Atlanta, Ga., has been awarded the honorary degree of Doctor of Science by the University of Georgia.

CLARENCE M. BROOKS has been appointed deputy commissioner of highways with headquarters at Montpelier, Vt., by the new Vermont state highway board and will be directly in charge of road maintenance work.

BURTON SMITH, for several years chief engineer of the Oakdale (Cal.) irrigation district, has resigned to become superintendent and chief engineer of the Merced irrigation district.

ALBERT GIVAN has been appointed city engineer of Sacramento, Cal., to take office July 1, when the new city-manager plan goes into effect.

GIBBONS & BROWN is a firm of consulting engineers recently organized by J. O. G. Gibbons, formerly with Westinghouse, Church, Kerr & Co. and recently in private practice, and by C. E. Brown, for the past few years a U. S. ordnance engineer. The firm will specialize in power plants and industrial problems and will be located in Newark, N. J.

F. H. SHAW of Lancaster, Pa., has been chosen engineer for the Borough of Lewistown on the construction of the South Main St. bridge over Kishacoquillas Creek.

ELLIOTT E. NASH, formerly general manager of the Minneapolis & St. Louis R.R., with headquarters at Minneapolis, has been appointed vice-president and general manager.

GEORGE T. DONOGHUE has resigned as chief engineer of the Lincoln Park Commission, Chicago. He has negotiations under way for further engagement, regarding which announcement will be made shortly.

RUSSELL H. CHITTENDEN, director of the Sheffield Scientific School, Yale University, for 21 years, will retire from this office next June.

W. D. MAXWELL has been reappointed engineer of Sac County, Iowa.

FRED S. MORSE has been appointed city engineer of Springfield, Ill.

CHARLES M. SCHWAB has received the degree of Doctor of Engineering from Stevens Institute of Technology.

GEORGE S. COWDERY, JR., for the last two years with the Royal D. Salisbury Co., engineers, Denver, Col., has been appointed district engineer of the Chadron, Neb., office of that company.

COLONEL J. C. ROPP, of the engineering organization of the J. G. White Management Corp. has been appointed by Director Charles G. Dawes as one of four assitants in directing and organizing the work of the new Federal Budget Bureau.

ALBERT H. RHETT, formerly engineer of structures, New York, Westchester & Boston Ry., and recently engineer for Toch Bros., New York, manufacturers of technical paints and varnishes, has been appointed sales manager of this firm.

C. E. PAUL, consulting engineer National Lumber Manufacturers Association, at its Chicago office, has resigned effective July 1, and after a brief vacation will resume his former private consulting practice specializing in construction and materials. He has been connected with the lumber association for six years and has had a large part in the development of its technical work.

Business Side of Construction

Facts and Events that Affect Cost and Volume

International Statistical Bureau on Construction Proposed

Delegates of the Associated General Contractors of America will present a plan for an international statistical and informational bureau on construction at the first annual meeting of the International Chamber of Commerce at London, June 27-July 1. The functions of such a bureau would be to furnish information on the following subjects: (1) Raw materials—prices, sources, and general data; (2) manufactured materials and machinery—sources and supply; (3) demand for raw materials, manufactured supplies and machinery; (4) character and amount of construction progress throughout the world; (5) labor—demand and supply, skilled and unskilled; (6) latest discoveries and methods in construction throughout the world; (7) transportation; (8) finance, including methods of financing construction and review of present conditions; (9) import and export tariff data; (10) government control of construction, materials, labor, transportation, credit, and mass production methods; (11) dumping possibilities; (12) agencies and associations in construction; (13) technical schools and journals; (14) new market opportunities.

The A. G. C. will be represented at the International Chamber meeting by Noble Foster Hoggson, of Hoggson Bros., New York City, and John R. Wiggins, the John R. Wiggins Co., Inc., Philadelphia.

Report on Car Loadings

An increase of 82,489 in the number of cars loaded with revenue freight on American railroads during the week which ended on June 11, compared with the previous week was shown by reports just received by the car service division of the American Railway Association. The total for the week was 788,997 cars which was, however, 141,979 cars below that for the corresponding week in 1920 and 18,208 cars under that for the corresponding week in 1919. In making comparisons with the previous week, consideration must be given to the fact that observance of Decoration Day on May 30 resulted in a reduction of the total for the week.

With the exception of grain and grain products which showed a slight reduction, the loading of all other classes of commodities was larger than the preceding week, the largest gains being in merchandise and miscellaneous freight which includes manufactured products, and in coal. The total for the first named class was 469,295 cars or an increase of 52,074 over the previous week. Coal loadings totaled 163,088 cars which was an increase of 20,414 over the previous week but 28,400 cars under the corresponding week last year.

Building Situation Analyzed in Questionnaire

That the country is not industrially overbuilt; that building should be undertaken now; and that labor costs and material prices are the principal deterrents to building, are facts revealed in a questionnaire recently sent out by the Detroit Steel Products Co. The Detroit company circularized more than 200 architects, engineers, and contractors with a view to seeking a nationwide opinion upon industrial construction work. One hundred and seventeen replies were to the effect that building should be done now and 136 replies were to the effect that the country was not over built industrially. In answer to the question, "What do you think is needed to make prospective builders go ahead with plans?" Eighty-three replied that lower material prices were necessary and eighty-three also that lower labor costs were needed. Considerations next in order of importance were stabilization of prices, easier credit, settlement of labor disputes, increased confidence in building, lower freight rates, and better general business conditions. Three-fourths of the replies received indicated that builders felt there would be a further reduction in both prices of building materials and cost of building labor.

There was wide variation in the opinion as to upon what basis prices would be stabilized, answers being received stating that the basis of stabilization would be all the way from 10 to 100 per cent above the 1913 level and all the way from 10 to 50 per cent below present prices.

Government Soon to Act in Building Investigation

According to a recent announcement made by Attorney-General Daugherty, one of the open price associations of New York City whose activities were under scrutiny by the Lockwood joint commitee on housing is soon to be the defendant in a suit instituted by the government. It was intimated that suit might be started simultaneously against this national association in several cities.

Factory Wages Decrease

Factory workers in New York State received an average of 34c. less a week in May than in April according to figures compiled by the State Department of Labor. The average weekly wage of a factory worker for May was $25.86. The average earning in New York City was $27.45, or 39c. less than in April, while in up-state factories the average was $24.85—33c. less than in April.

Further Wage Adjustments Made

Adjustment of wage disputes in the building industry on a basis of reduced pay has been accomplished in several cities during the past week. A tie-up in building work which had been current since Apr. 1 in and near Davenport, Iowa, ended a few days ago, when agreements were signed with the employers by the unions, a separate one being signed by each craft, providing for a 12½c per hour reduction for all crafts. This amounts to a decrease of $1 per day with a general scale of 87½c per hour.

In Tulsa, Okla., where building conditions have been unsettled for a couple of months, bricklayers and hod carriers have consented to a reduction in pay, the new wage scale being $11 per day, whereas the old one was $12. The decision to impose the $1 a day decrease was arrived at after a lengthy conference on the part of the arbitration board.

Press dispatches indicate that the building strike in Springfield, Mass., is also ended. The carpenters union and the building trades employers association agreed on a wage cut of 10c. an hour. Carpenters are to receive 85c. an hour; bricklayers, 95; plasterers, 95c.; electricians, lathers and painters, 85c.; hoisting engineers, 90c.; sheet metal workers, 85c.; masons' tenders, 65c.; steamfitters' helpers, 55c.; and electricians' helpers, 35c. The highest wage in the new schedule is that for structural iron-workers—96½c. an hour.

For the purpose of stimulating building operations in Hartford, Conn., the structural building trades alliance made a voluntary offer of a flat 10 per cent reduction in wages to a committee representing the building employers association. The offer affects carpenters, plumbers, steamfitters, electricians, painters, sheet metal workers, iron workers, stationary engineers, and lathers. Masons and masons' tenders are not included, for the former have already accepted a decrease and the rate for the latter is still being debated.

A partial settlement of the wage differences in Newark has been made. Carpenters, bricklayers, iron workers, hoisting engineers, and laborers have returned to work, the resumption following the signing of an agreement between a committee from the General Contractors Association and the executive committee of the bricklayers.

West Coast Lumber Production

For the week ending June 11, 114 mills reporting to the West Coast Lumberman's Association reported a production of approximately 58,000,000 ft. b.m., which is 30 per cent below normal. New business totaled 51,000,000 ft. b.m. and shipments 61,500,000 ft. b.m.

Output of Contractors' Machinery for 1919 Valued at $186,000,000

A preliminary statement of the general results of the 1920 census of manufacturers has been issued by the Bureau of the Census, Department of Commerce, furnishing statistics concerning the value of various kinds of machinery manufactured during the year 1919. According to the tabulation, the value of the total production of contractors' equipment and machinery amounted to approximately $186,000,000. The largest valuation placed upon the manufacture of a single line of equipment was for pumps and pumping machinery, the output of which was estimated in value at $65,360,000. The following list showing production valuations has been taken from the general list of machinery as compiled by the Bureau of the Census; air compressors, $13,960,000; brick, pottery, and other clay working machinery, $5,371,000; concrete mixers, $9,579,000; cranes, electric, $25,865,000; cranes, steam and hydraulic, $13,515,000; cranes other than electric, steam and hydraulic, $9,568,000; dredging machinery, $1,939,000; excavating machinery, $6,641,000; gas machines and apparatus, $7,898,000; hydraulic rams, $1,369,000; pumps and pumping machinery, $65,360,000; roadmaking machines, $13,915,000; steam shovels, $9,654,000; and well drilling machinery other than oil well, $1,663,000. This makes a total of $186,297,000. The figures for 1919 are only preliminary and may be subject to such changes as are necessary in a further examination of the reports submitted to the Bureau of the Census.

Retail Food Prices Drop

According to a recent bulletin issued by the Bureau of Labor Statistics, the retail food index issued by the United States Department of Labor shows a decline of 4.8 per cent in the retail cost of food to the average family in May as compared with April. Prices of thirty-five of the forty-three articles of food reported to the Bureau of Labor Statistics each month, and which are the basis for the index figure, decreased during the month from April 15 to May 15. The general level of wholesale prices was only slightly lower in May than in April, the weighted index number dropping from 154 to 151.

Bids on Bridge Repair Drop 50 Per Cent in Nine Months

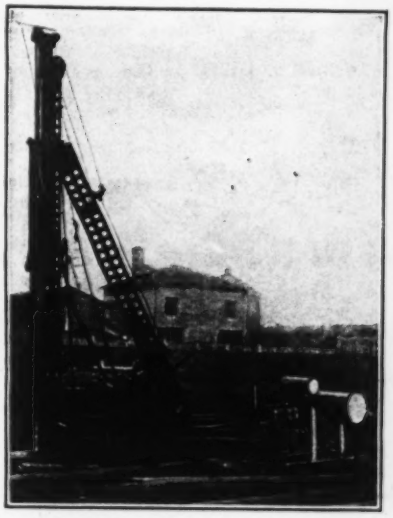
A repair job on the Lincoln Highway bridge over the Hackensack River will be contracted for at one-half the price bid nine months ago if the low bidder in the recent bid opening gets the contract. The work consists of repairs to the hand rail and bids for the repair work were first opened in September 1920, when the low bid was found to be $14,751. The lowest bid received last week for the same work was $7,197. The highest bid received last week was $2,251 under the low bid received nine months ago.

Portable Power Plant for the Contractor

(Berlin Correspondence)

To furnish power required for the performance of various duties in building construction a unique plant has been designed by an Austrian engineer, Dr. Merkl. The power plant, shown in an accompanying photograph, has so been arranged that not only is the gasoline engine—which was selected as the prime mover—available for its usual uses, but it drives a compressor for pneumatic tools and carries a small electric generator set to provide electric power for lighting purposes and for the propulsion of machinery. The whole outfit is capable of performing the following operations:

1. Piledriving with a weight of ram of 370 kg. of fifteen to sixteen full strokes, 1.9 per minute. With an extension ram bringing the weight up to 600 kg., ten to eleven strokes per minute are produced.



AUSTRIAN PORTABLE POWER PLANT

2. Electric power for lighting and for driving drilling machines.

3. Slotting and drilling of wood and iron by means of portable electric drilling machines.

4. Driving a circular saw by belt or universal joint.

5. Acting as a blower for a forge.

6. Driving a centrifugal pump and a concrete mixer.

7. Providing compressed air for a caisson at moderate depth and for pneumatic rock drills and riveting hammers.

The power plant forms a small, compact unit, can be easily moved and placed in any desired spot, and requires but little space. The gasoline motor produces from 14 to 16 hp. In the smaller outfit two of the four cylinders are adapted for acting as compressors, while in the larger outfit a special two-cylinder compressor is provided for directly coupled to the four-cylinder motor.

The piledriver, the most substantial part of the outfit, contains several novel features. It consists of the base placed on three wheels with two runners which can be erected upright or put in an inclined position, two braces, and lastly the ramming mechanism. The three former parts are of channel iron and the base consists of six channel irons put together by screw bolts. The two runners and the braces are held rigidly in position by cast steel cross pieces, of which the runners have three, one each at the bottom and top ends and one in the upper half. The bottom pieces carry the trunnions upon which the runners are hinged for hoisting or lowering them. The windlass for hoisting and keeping in position the pneumatic hammer is mounted on the braces. This is worked by hand in the case of the smaller outfit and by compressed air in the larger outfit.

Contract for Tile-Concrete Smelter Stack Let

A contract was recently let to the Wiederholt Construction Co., St. Louis, for the erection of a stack 24 ft. inside diameter at the top, 450 ft. high above foundations, and a foundation octagonal in shape 87 ft. between parallel sides. The stack is to be located at the Midvale smelter plant of the United States Smelting, Refining & Mining Co., about seven miles south of Salt Lake City, Utah. The construction is to be of Wiederholt patented hollow tile with steel reinforcement in both vertical and circumferential directions, the interstices of the tiling being filled with concrete. A 4-in acid-proof lining is provided with a 3-in. air space between the inner and the outer shells. The foundation rests upon a subsoil of sand and clay, free of surface water. The engineer in charge of construction is L. D. Anderson, chief metallurgical engineer for the U. S. Smelting, Refining & Mining Co.

Building Trades Wages in Various Countries

According to a pamphlet embodying tariff information for the use of the committee on ways and means of the United States House of Representatives, the greatest per cent increase in the wages of building labor in the interim 1914-1920 was experienced in Japan. Wages of bricklayers, common laborers and carpenters rose 228 per cent, 346 per cent, and 226 per cent, respectively in that six-year period. In Germany the wages of bricklayers and painters decreased from 1914-1920, 17 and 23 per cent respectively, through there was a much higher rate existing between 1914 and 1920. In England the per cent increases resemble those of the United States quite closely, the increases in the United States being: Bricklayers, 72 per cent; laborers, 123 per cent; carpenters, 91 per cent; painters, 100 per cent; plasterers, 69 per cent. In England the per cent increase were: Bricklayers, 91 per cent; laborers, 160

per cent; carpenters, 104 per cent; painters, 117 per cent, and plasterers, 103 per cent.

The information from which this digest was made for the Congressional committee was taken from various sources. For the United States the average rates for May of each year are given, the figures being supplied by the *Monthly Labor Review*. In Germany the rates are the quoted rates for the district of Stettin, taken from the German industrial inspector's report. The monthly journal of Yokohama's Chamber of Commerce and the Department of Agriculture and Commerce for Japan furnished the figures for that country and the wages quoted are for all Japan for 1914, and the wages per day in Yokohama in 1920. The *British Labor Gazette* supplied the figures for England.

Imports and Exports

According to announcement recently made by the Bureau of Foreign and Domestic Commerce, the total imports for the month of May, 1921, were approximately $205,000,000 and the total exports approximated $300,000,000. The imports for May, 1920, were $431,000,000 and the exports, $745,500,000. For the eleven months ended in May the total imports amounted to $3,468,787,153 and the exports, $6,179,360,357. For the eleven months ended May, 1920, the imports were $4,685,846,580 and the exports, $7,479,611,906.

Philadelphia Plans Sewer Work

The city of Philadelphia will receive bids during late July for the construction of a 6 ft. 6 in. concrete sewer in various streets. The total estimated cost is $1,300,000 and the length of sewer to be built is 63,000 lin.ft.

Road Bonds Sell at Par

Bonds of Pennsylvania's 5 per cent Series C highway construction issue, amounting to $8,805,000, were sold recently at par and accrued interest, a syndicate of Philadelphia, Pittsburgh and New York bankers making the offer on condition that all other bids be rejected and that the bonds not be put out until October.

Weekly Construction Market

THIS limited price list is published weekly for the purpose of giving current prices on the principal construction materials, and of noting important price changes on the less important materials. Moreover, only the chief cities are quoted.

The first issue of each month carries complete quotations for all construction materials and for the important cities. The last complete list will be found in the issue of June 2, the next, on July 7.

	New York	Atlanta	Dallas	Chicago	Minneapolis	Denver	San Francisco	Seattle	Montreal
Steel Products:									
Structural shapes, 100 lb	—$3.23	$4.00	$4.50	—$3.13	$3.51	$4.65	$4.35	$4.60	$5.00
Structural rivets, 100 lb	4.85	5.25	—5.75	4.88	5.30	—6.00	6.40	5.50	8.50
Reinforcing bars, ¾ in. and larger, 100 lb	—3.13	3.25	3.75	—3.00	3.53½	4.32½	2.35	4.00	4.25
Steel pipe, black, 3½ to 6 in. lap, discount	52%	50.65–5%	45%	58½%	51.9–5%	29%	49.80	47½%	5%
Cast-iron pipe, 6 in. and over, ton	54.00	59.22	65.00	54.10	62.80	70.00	85.90	65.00	75.00
Concreting Material:									
Cement without bags, bbl	2.10(del.)	2.60	+2.80	2.17	2.46	3.10	3.09	3.10	3.40
Gravel, ¾ in., cu.yd	2.50	—2.35	—3.00	2.25	2.00	2.50	2.25	1.50	1.50
Sand, cu.yd	1.25	—1.40	—2.50	2.25	1.00	1.10	1.50	1.50	1.25
Crushed stone, ¾ in., cu.yd	2.15	—2.25	2.80	2.50	2.25	3.50	2.25	3.50	2.10
Miscellaneous:									
Pine, 3x12 to 12x12, 20 ft. and under, M.ft	43.00	40.00	—35.00	55.00	36.00	47.00	27.00	28.50	110.00
Lime, finishing, hydrated, ton	21.00	21.00	25.00	20.00	29.00	32.00	25.40	24.00	30.00
Lime common, lump, 200 lb. bbl	3.30	1.50	2.75	1.65	1.50	3.10	2.25	2.75	1.00
Common brick, delivered, 1,000	18.40	—11.00	12.50	12.00	17.00	14.00	18.00	16.00	18.00
Hollow building tile, 4x12x12, block	Not used	.14	.13	.12	.092	.09	.12½	.11	.19
Hollow partition tile 4x12x12, block	.1345	.15	.13	.096	.092	.10	.14½	.12	.....
Linseed oil, raw, 5 bbl. lots, gal	.80	.80	.98	.88	.91	.95	.96	.79	.84
Common Labor:									
Common labor, union, hour	.75@.80	.35	.....	1.00	.50	.50@.63½	.81½	.75	.....
Common labor, non-union, hour	.....	.25	.35@.45	.45	.50	.37½@.50	.50@.55	.50	.35

Explanation of Prices—Prices are to contractors in carload lots unless other quantities are specified. Increases or decreases from previous quotations are indicated by + or — signs. For steel pipe, the prevailing discount from list price is given: 45-5% means a discount of 45 and 5 per cent, 45@50 means a range of 45 to 50 per cent. Charge of 15c. per 100 lb. for cutting reinforced steel into 2-ft. lengths or over. **New York** quotations are delivered except tiles, which are "on trucks." Sand, gravel and crushed stone are quoted alongside dock. **Chicago** quotes hydrated lime in 50-lb. paper bags. **Minneapolis** quotes on fir instead of pine. Brick and hollow tile delivered. Gravel, sand and crushed stone quote at pit. Common labor not organized. **Denver** quotes cement "on tracks"; gravel and sand at pit, stone on cars, lime, brick, hollow tile and lumber on job. Tile price is at warehouse. Linseed oil, delivered. **Atlanta** quotes sand, stone and gravel per ton instead of cu.yd. **Dallas** quotes lime by the 180-lb. bbl. Steel and crushed stone are quoted f.o.b. cars, other materials delivered. **San Francisco** quotes on Heath tile, 5½ x 8 x 11½. Prices are all f.o.b. warehouses except C. I. pipe, which is mill price plus freight to railway depot at any terminal. Lumber prices are delivered "at ship tackle in San Francisco ex mill." **Seattle** quotes on Douglas fir instead of pine; and on lime in paper bags. **Montreal** quotes sand stone, gravel and lump lime per ton. Cement, lime and tile are delivered; sand, gravel and stone, on siding; brick f.o.b. plant; steel and pipe at warehouse. No organized common labor in Montreal.

Changes Since Last Week

A warehouse decrease on steel has just been announced in New York. Structural shapes are now selling for $3.23 delivered, as against $3.33 formerly. Reinforcing bars now sell for $3.13, uncut, and $3.28 cut to 2-ft. and over. The Pittsburgh mills are reporting to be operating at about 25 per cent capacity. There is practically no inquiry for billets, bars, plates or rods.

The brick market is much firmer in New York, with $15 the general price alongside dock, although sales have been made at $16. Elsewhere, also the market is firm. Atlanta, quoting $11 as against $11.50 last week, reports the only change during the week.

The lumber market is holding fairly firm, although Southern pine is down $1 in New York. Dallas shows a rather sharp decline, without explanation.

As to labor, it is expected that Judge Landis' decision on the Chicago labor controversy will attempt to end jurisdictional disputes as well as settle the local difficulty. Work is proceeding satisfactorily in Chicago, and permits issued last week totalled 195, at a value of $3,194,250. In Minneapolis the unions have not officially recognized the May 1 cut of 20 per cent but the employers' association reports plenty of labor available at the new scale.

Volume 86 New York, June 30, 1921 Number 26

Engineering News-Record

A CONSOLIDATION OF ENGINEERING NEWS AND ENGINEERING RECORD.
WITH WHICH IS INCORPORATED THE CONTRACTOR

E. J. MEHREN, *Editor*

Engineering College Registration Shows 4-Per Cent Gain 1104
CENSUS BY "ENGINEERING NEWS-RECORD" covers 48,312 students in 81 institutions located in 36 states. Mechanical engineering most popular course.
Engineering News-Record, June 30, 1921. 6 cols. Ill.

Indian State Builds a Power and Irrigation Dam 1107
BY E. W. T. SLATER.
DAM NOW UNDER WAY on project in state of Mysore one of large masonry structures of the world.
Engineering News-Record, June 30, 1921. 3 cols. Ill.

Protective Gallery on Tunnel Approach 1108
Engineering News-Record, June 30, 1921. 1 col. Ill.

Ethical and Practical Considerations Regarding the Engineering Corporation 1109
DEVELOPMENT LED NATURALLY to association with non-engineers. Ethical questions not essentially different from those confronting individual consultants.
Engineering News-Record, June 30, 1921. 5¼ cols.

Building the Jersey City Prize-Fight Stadium 1112
MATERIALS DELIVERY ESSENTIAL FEATURE. Octagonal structure covers eight acres and contains 2,000,000 ft. b.m. of lumber.
Engineering News-Record, June 30, 1921. 3¼ cols. Ill.

Work of the Swiss Bridge-Builders' Structural Research Board 1113
Engineering News-Record, June 30, 1921. ¾ col.

New Method of Determining Efficiency of Centrifugal Pumps 1114
BY ALLEN F. SHERZER.
Engineering News-Record, June 30, 1921. 3¾ cols. Ill.

Testing-Cylinders for Illinois Experimental Road 1116
BY H. F. CLEMMER.
Engineering News-Record, June 30, 1921. 1¼ cols. Ill.

Findings of Los Angeles Sewage Disposal Commission 1117
Engineering News-Record, June 30, 1921. 2¼ cols.

Maintenance of Paving by Street Railway Companies 1118
BY W. SWARTZ.
DISTRIBUTION OF MAINTENANCE COST. Headers isolate track strip from street at Toledo. Removable special sections.
Engineering News-Record, June 30, 1921. 3¼ cols. Ill.

Further Power Development at Niagara 1120
Engineering News-Record, June 30, 1921. 1¼ cols.

Rubber Paving in London 1120
Engineering News-Record, June 30, 1921. ½ col.

Wear Tests Show Service Qualities of Paving Materials 1121
IMPACT A BIG FACTOR. Bituminous fillers show up well. Rattler reliable. Sand cement bed best.
Engineering News-Record, June 30, 1921. 2 cols. Ill.

Winter Work on a Quebec Water-Power Development 1122
DAM CONSTRUCTION near Chicoutimi required long hauls over snow roads and special provisions for camp sanitation in cold weather. Fire in camp impeded operations.
Engineering News-Record, June 30, 1921. 7¼ cols. Ill.

A View of "Value for Rate Base" and "Value for Compensation" 1125
Engineering News-Record, June 30, 1921. ¾ col.

Report of Annual Meeting of the American Society of Testing Materials 1126
Engineering News-Record, June 30, 1921 12 cols.

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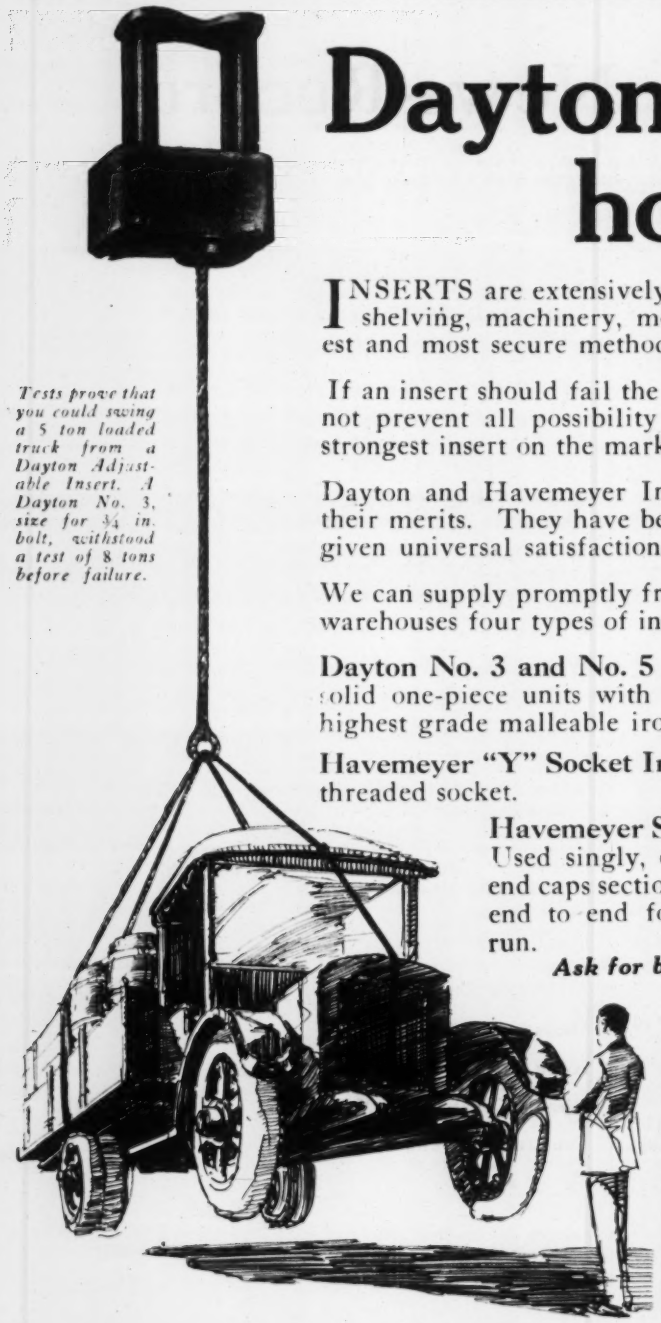


Tests prove that you could swing a 5 ton loaded truck from a Dayton Adjustable Insert. A Dayton No. 3, size for ¾ in. bolt, withstood a test of 8 tons before failure.

Dayton Inserts hold the load

INSERTS are extensively used in factories for supporting shafting, shelving, machinery, motors, pipes, etc. They constitute the cheapest and most secure method of support.

If an insert should fail the loss and damage would be serious. Why not prevent all possibility of such loss by using the strongest insert on the market?

Dayton and Havemeyer Inserts have actually proved their merits. They have been used for years and have given universal satisfaction.

We can supply promptly from large stocks in our own warehouses four types of inserts, as follows:

Dayton No. 3 and No. 5 Adjustable Inserts—Both solid one-piece units with keyhole slot. Made from highest grade malleable iron.

Havemeyer "Y" Socket Insert—Malleable iron with threaded socket.

Havemeyer Slotted Insert—Used singly, or by removing end caps sections can be placed end to end for a continuous run.

Ask for booklet A-7

Dayton No. 5

Havemeyer "Y" Socket

Havemeyer Slotted

Havemeyer Concrete Products carried in stock in our own warehouses in principal cities all over the country.

Inserts	*Channels*	*X-Tension Clips*
Bar-Tys	*Metal Lath*	*Beam Saddles*
Ty-Chairs	*Bar-Spacers*	*Easel Chairs*
Hy-Chairs	*Wall Anchor*	*"Sani-Tread"*
Curb-Bars	*Corner Bead*	*Form Clamps*
Wire Mesh		*Expanded Metal*

Concrete Steel Company

42 Broadway, New York

Philadelphia, Kansas City, Cincinnati — Pittsburgh, Washington, Birmingham — Des Moines, Baltimore, Cleveland — St. Paul, St. Louis — Syracuse, Hartford — Detroit, Norfolk, Chicago — Denver, Boston, Omaha

HAVEMEYER SERVICE

In the final analysis, all arguments in favor of Raymond Concrete Piles come down to the basic factor of certainty—the protecting steel shell is left in the ground.

Raymond Concrete Pile Co.
New York, 140 Cedar Street
Chicago, 111 W. Monroe Street
Raymond Concrete Pile Co., Montreal, Can.
Branch Offices in All Principal Cities

A FORM FOR EVERY PILE

A PILE FOR EVERY PURPOSE

SHIP AND SAIL
IN AMERICAN SHIPS
FOR seventy years there has been no American Merchant Marine of sufficient importance to be called such. Before that—back in the days when the clipper ship carried the world's freight—the American skipper was known in every port.
The war came, and with it a need for "ships, money and men." The three were found to fill the need—and the American Merchant Marine came back.
As the steam vessel drove the clipper off the seas, so is the oil-burning American ship once more gaining its old-time place in world commerce.
The ships are there. Good ships, making the ports of all the world, with freight rates and schedules that are on a competitive basis.
"American ships for American goods" is as vital a thought as can be presented to business men. The development of the American Merchant Marine is imperative if America is to progress—and that development is in the hands of American Business to make.
U. S. SHIPPING BOARD
WASHINGTON, D. C.
For sailings of passenger and freight ships to all parts of the world write Division of Operations, Traffic Department, U. S. Shipping Board Emergency Fleet Corporation, Washington, D. C.
E-2
AMERICAN SHIPS FOR AMERICAN GOODS

How Much Does *Your* Building Weigh?

Unnecessary weight squanders dollars. Every extra pound in your building must be paid for three times—in first cost, freight charges and labor of erection.

Truscon Steel Joists

Truscon Steel Joists eliminate this extra expense—they provide strength and fireproofness with minimum weight. They can be used to great advantage with reinforced concrete or structural steel columns and girders, or with masonry walls. Size and cost of supporting members are reduced, eliminating superfluous weight, yet **Truscon Steel Joists** efficiently support the loads for which they are designed.

For apartment houses, hotels, schools and all construction not requiring excessive loads, **Truscon Steel Joists** mean economy. They are easily erected with minimum labor, and unhampered by weather conditions. Fabricated from high-grade steel, rolled free from flaws or internal stress.

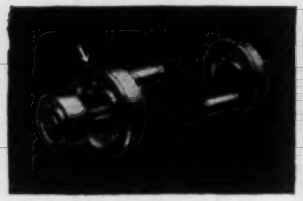
Large stocks permit quick shipment. Write for full data, and let our engineers explain the advantages of this construction.

Light Weight of Truscon Steel Joists means easy handling and minimum labor

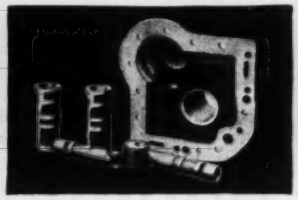
TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO
Warehouses and Sales Offices in Principal Cities

TRUSCON BUILDING PRODUCTS

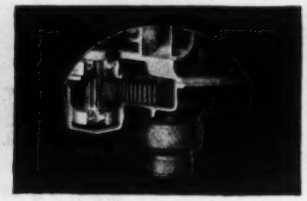
THE "BIG FOUR" REASONS WHY LITTLE GIANTS ARE THE WORLD'S STANDARD AIR DRILL



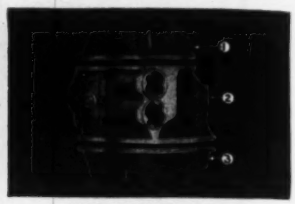
3-Point Crankshaft Suspension



Balanced Piston Valves

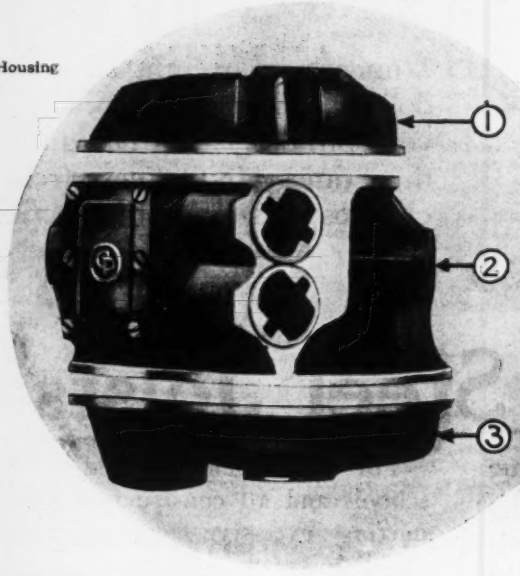


Stub-Tooth Gears



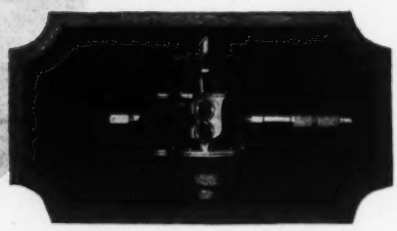
Three-Unit Housing

1 Bonnet
2 Cylinder Housing
3 Gear Case



Reason No. 4

The branch nearest you is stocked with a complete line of Little Giant Air Drills in sizes and types to meet every need of drilling, wood-boring, reaming, tapping, screw-setting operations. Ask for Bulletin 598.



Little Giant No. 2 Air Drill
Non-Reversible Type

CONCERNING Jack and Jill, Shakespeare might have said: "Was it Jack or was it Jill? That's the question! Was it not Jill that caused the water to be spilled? And crushed his skull in such a way? And caused such inconvenience?"

But why blame it on *Jill* when *Jack* did it? Jack is the Cylinder Housing of your air drill. Jill is the Bonnet. Little Giant Air Drills make Jack and Jill go down the hill of repair costs, each on his own "hook." If Jack falls down on the job due to accident or wear, Jill doesn't go tumbling after him into the scrap heap.

With Little Giant Air Drills with their *three-unit* housing in your shop, there won't be any question as to *which* did it. Besides, ask the tool-room foreman about this Little Giant feature from the standpoint of accessibility for cleaning and inspection. Do it now!

Chicago Pneumatic Tool Company

Chicago Pneumatic Building · 6 East 44th Street · New York

*Sales and *Service Branches all over the World*

*Birmingham *Boston *Buffalo *Chicago *Cincinnati *Cleveland *Detroit El Paso Erie Franklin Houston Joplin *Los Angeles *Minneapolis *New Orleans *New York *Philadelphia *Pittsburgh Richmond Salt Lake City *San Francisco *Seattle *St. Louis Basle *Berlin *Bombay Brussels Buenos Aires Christiania Copenhagen *Frankfurt-a-M Havana Helsingfors Honolulu Johannesburg *London Manila Milan Montevideo *Montreal Osaka Paris Rio de Janeiro *Rotterdam Santiago Sao Paulo Seoul Shanghai Tientsin Tokyo Toronto Vancouver Winnipeg

P-119

BOYER PNEUMATIC HAMMERS · · LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS · · VACUUM PUMPS · · PNEUMATIC HOISTS
GIANT OIL AND GAS ENGINES · · ROCK DRILLS · · COAL DRILLS

LITTLE *The World's Standard* **GIANT** *Air Drill*

Best Tracklayer "Sixty" working on a tough piece of grading

Saving Time and Overhead with the Tractor

Tractor power provides the road maker with the necessary energy for his operations in a form far more dependable, easily-managed and economical than horses or mules.

The right kind of tractor saves valuable time and reduces the number of men on the job. There are no halts for rest, no staggering in the heat of the day, no expensive feed bills, and fewer hands are required for a given job. Power is steady, with a reserve that takes grader, scarifier and leveler through tough spots like a knife through cheese.

Best Tracklayer Tractors are admirably suited to road work. Easy to manage and guide, they turn in their own length, and the long, wide tracks take them over rough, soft or sandy ground with ease. Traction is tremendous, with consequent increased draw-bar pull. Their reputation for dependability, low-operating cost and long life is established—a reputation gained through many years' successful performance on heavy-duty work of all kinds.

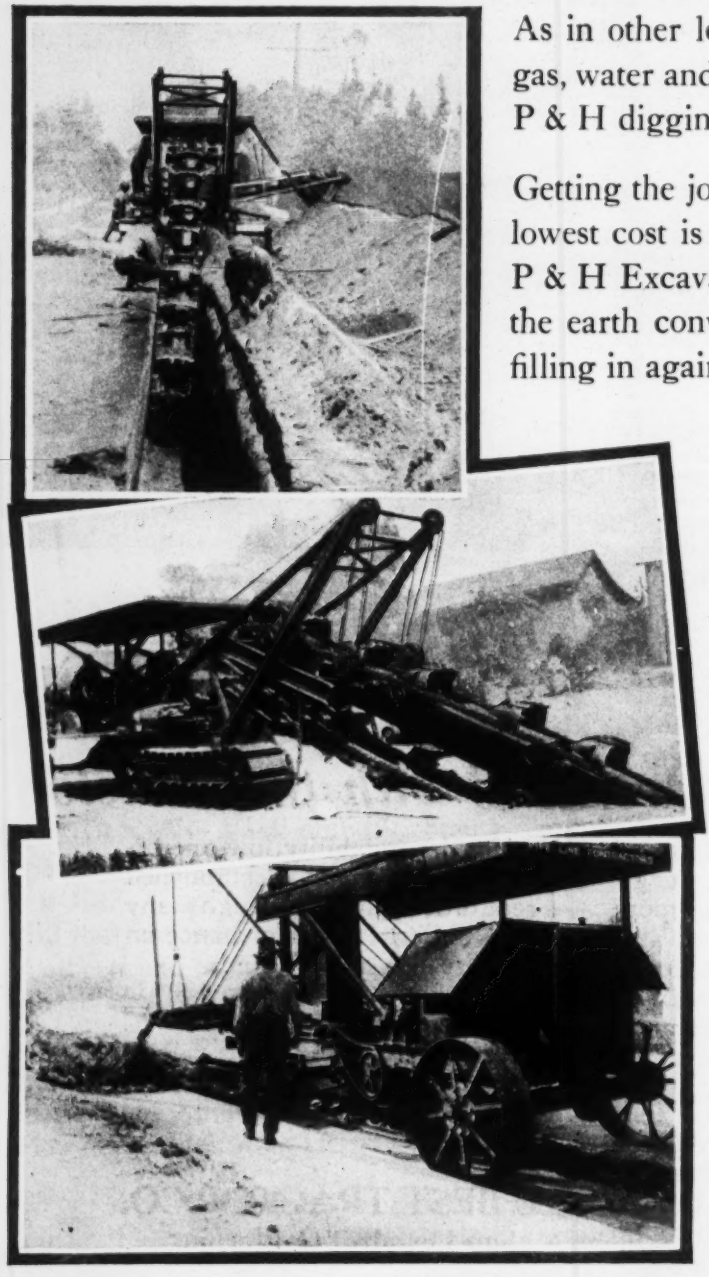
Best Tracklayer Tractors are built in three models—the "Sixty," the "Thirty," and the "Cruiser" (60). The latter is designed especially for logging, hauling and contracting.

Write for full specifications, prices and the name of our nearest dealer.

C. L. BEST TRACTOR CO.
San Leandro, California

BEST TRACKLAYER TRACTORS

Speeding Up in South Pasadena



Speedy trench digging in South Pasadena by Thomas Haverty Company of Los Angeles, pipe line contractors. They use both the Ladder type and Wheel type P & H Excavators.

As in other localities, slow trench digging for gas, water and sewer pipes has been replaced by P & H digging.

Getting the job done in the shortest time and at lowest cost is accomplished through the use of P & H Excavators. A clean trench is dug and the earth conveyed to one side convenient for filling in again when the pipe is laid.

For backfilling machines are again available, one man and a P & H Excavator-Crane with backfiller scraper or the new P & H 203 Backfiller doing the work expeditiously and at a low cost.

Engineers who know earth handling machinery testify to the excellence of P & H design, construction and thorough workmanship.

New Bulletin 25X sent on request.

EXCAVATING MACHINERY DIVISION

PAWLING & HARNISCHFEGER CO.

Milwaukee, Wis., U. S. A.

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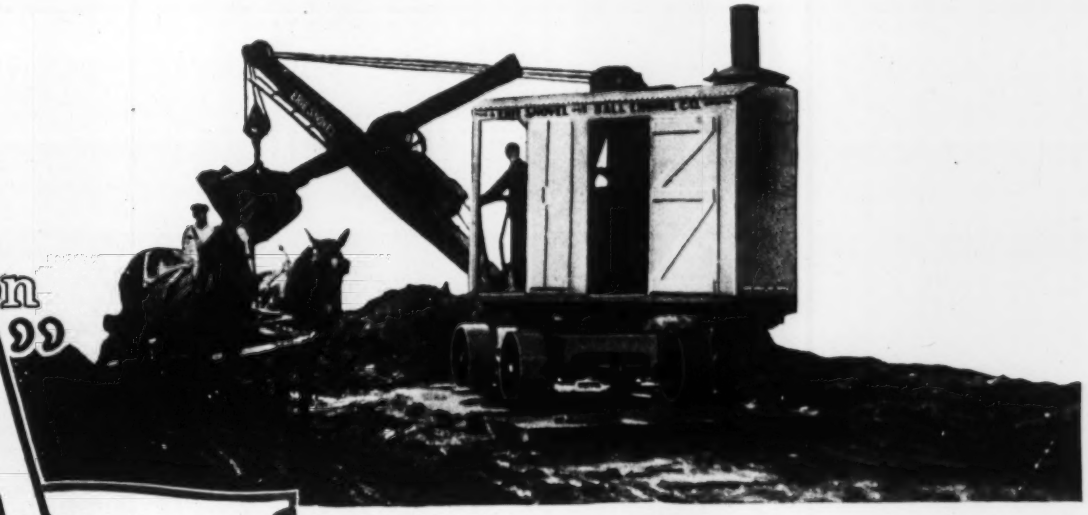
Los Angeles: Central Bldg.
Portland: Yeon Bldg.
Seattle: L. C. Smith Bldg.

Agents in 16 Other Cities.

P&H Trench & Dragline EXCAVATORS



13-ton "A" ERIE

On street grading a 10-inch cut

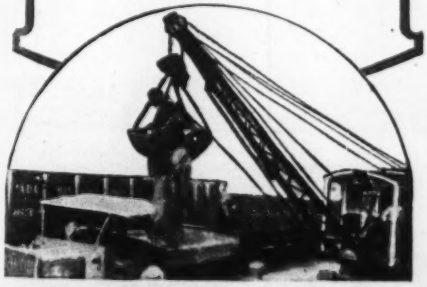
"We averaged 225 cubic yards per 9-hour day," writes Mr. Johnston, *"Which on this 10-inch cut surely comes up to my expectations."* S. H. Johnston, of S. K. Johnston & Son, Tarentum, Pa.

For such shallow cutting this is a very good output, profitable for the contractor. We have records of "A" ERIES that have done even better, under favorable conditions.

Use same ERIE for unloading cars

Every "A" ERIE Shovel can be quickly changed over to a Locomotive Crane, to handle a clamshell bucket. Unloads cars of stone, sand, etc. Dumps to storage piles or motor truck or charges concrete mixer, dumping directly into skip or hopper.

The photo below shows an "A" ERIE unloading cars direct to motor trucks.



For light road grading, buy a light shovel—

but buy a real steam shovel

Before you buy any machine for street or road grading, be sure that you have the answers to these questions:

1—*How much yardage has this machine actually delivered, on shallow-cut work like mine?* (Based on actual records made by other contractors month in and month out. Not the "rated capacity," but the real output.)

2—*In hard service, what will be my loss of time for repairs, and how much will my upkeep cost amount to?* (Considering only the actual experiences of other contractors who are using this equipment.)

3—*After I have given this machine a season's hard use, what will be its value for resale?* (Find out what shape these machines are in after two or three seasons of work similar to yours.)

These three questions mean a great deal more money to you—*far more*—than the mere matter of a few hundred dollars more or less in first cost.

Prove this fact for yourself. Before you invest thousands of dollars in a piece of equipment that is supposed to earn you many thousands more—

Invest two or three days of your time, visiting a few other contractors who have used the same machines that you are considering and trying to compare.

IT WILL BE THE MOST PROFITABLE TIME YOU COULD POSSIBLY SPEND!

We will be glad to tell you the names of contractors in your vicinity who are using ERIES—either the 13-ton "A" ERIE or the 20-ton "B." *Just write us for these addresses.*

BALL ENGINE CO., Erie, Pa., U. S. A.
Builders of ERIE Steam Shovels; Locomotive Cranes; Railway Ditchers
Branch Offices: NEW YORK, BOSTON, CHICAGO
Representatives throughout the U. S. A.

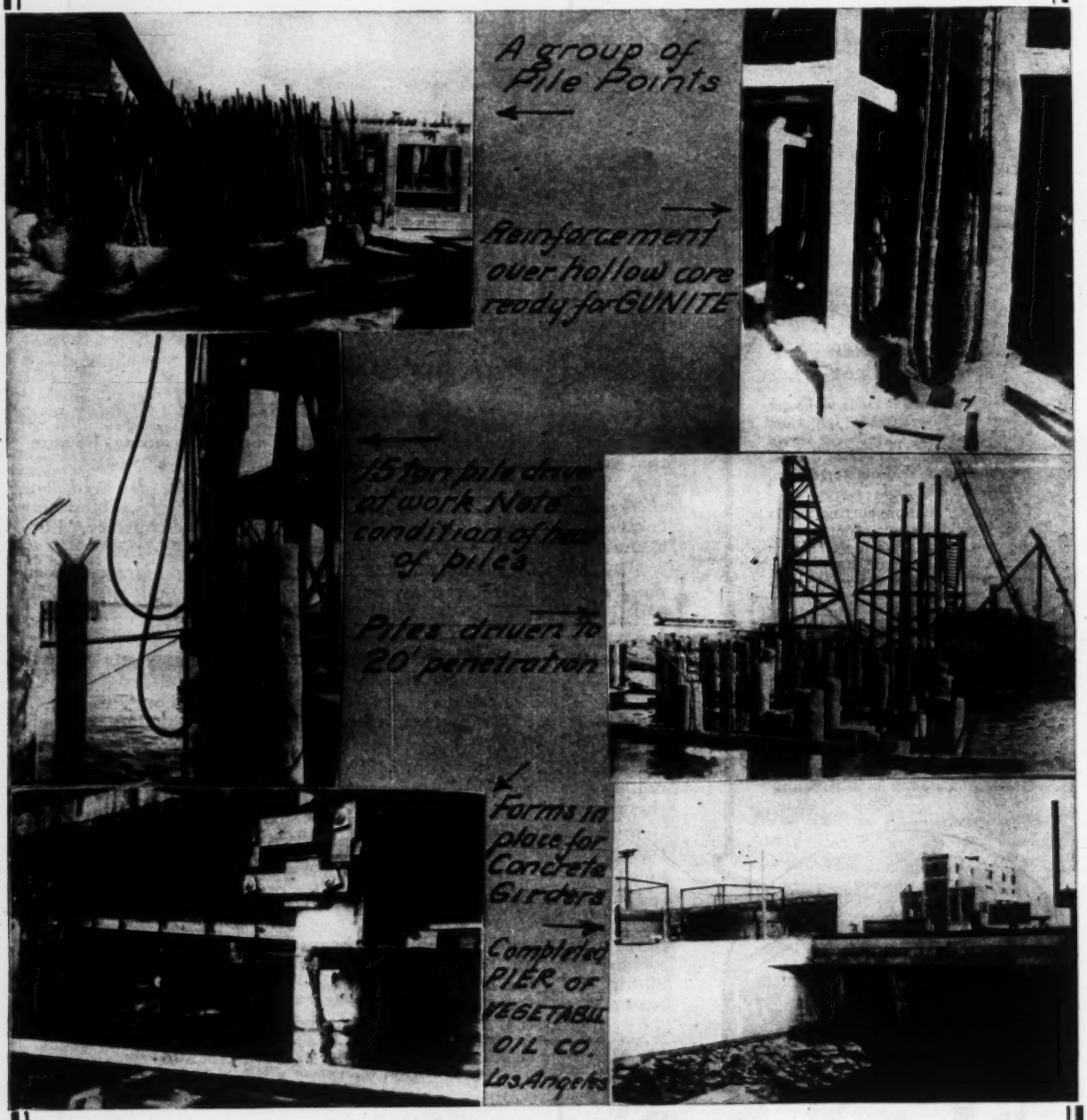
ERIE Revolving Shovels

BALL Engine Co. Erie, Pa.

Did you read the article in ENGINEERING NEWS-RECORD, March 10, 1921, describing

HOLLOW GUNITE PILES?

Whether you did or not the following PICTORIAL STORY will interest you.


A group of Pile Points
Reinforcement over hollow core ready for GUNITE
15 ton pile driver at work. Note condition of tops of piles
Piles driven to 20' penetration
Forms in place for Concrete Girders
Completed PIER of VEGETABLE OIL CO. Los Angeles

CEMENT-GUN CO., INC.

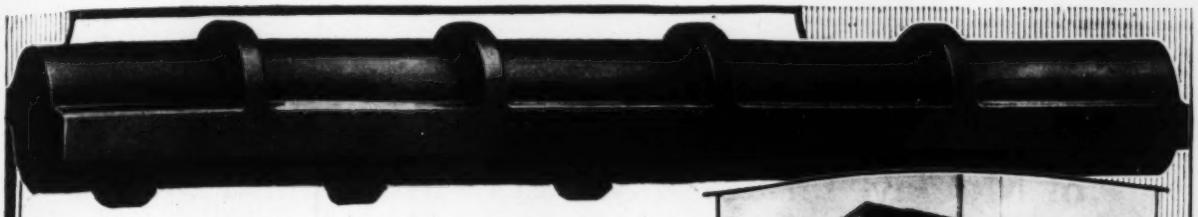
Cornwells Heights, Bucks Co., Penna.

Branch Offices:

New York Office, 30 Church St. Chicago Office, 616 Chamber of Commerce Bldg. Pittsburgh Office, 211 Fulton Bldg. Los Angeles Office, Citizens' National Bank Bldg. Spokane Office, 615 Mohawk Block.

Richmond Office, 812 Virginia Railway and Power Bldg.; General Supply Co., Ltd., Winnipeg and Ottawa, 2.

Agencies in all principal foreign countries.



For Small Jobs or Big Jobs—Use Corrugated Bars

EFFICIENCY of reinforcing material and promptness of delivery are appreciated whether the job is a small creamery like those illustrated here or a large factory or office building.

Corrugated Bars have the highest bonding value of all reinforcing material. (The Corrugated Bar is the oldest bar designed especially for concrete reinforcing.)

Warehouse stocks are carried in a number of carefully selected cities—prompt shipments can be made from a near-by point.

Many skilled labor problems have been solved by ordering Corrugated Bars shop-fabricated.

Fergus Co-op. Creamery Co., Fergus Falls, Minn.; C. W. Kampfe & Co., Archt., St. Paul. John Lauritzen, Con., Fergus Falls

Pelican Rapids Creamery Co., Pelican Rapids, Minn.; Archt. C. W. Kampfe & Co., L. W. Baumeister & Son, Contr.

Creamery Package Mfg. Co.; Fort Atkinson, Wis.; Archt. Martin Tullgren & Sons, Milwaukee, Wis., Con. The Rauff Co., Milwaukee, Wis.

Barnesville Coop. Creamery Assn., Barnesville, Minn.; Arch. C. W. Kampfe & Co., Perry Swanson & Co., Contr., St. Paul.

Corrugated Bar Company, Inc.

Buffalo, N. Y., U. S. A.

District Sales & Engineering Offices:

New York	Chicago	Boston	Philadelphia
Kansas City	Houston	Atlanta	Milwaukee
St. Louis	St. Paul	Syracuse	Detroit

For engineers, architects, contractors and students of reinforced concrete construction we offer a handbook, "Useful Data on Reinforced Concrete Buildings." Price $2.50

Corrugated Bars

FOR REINFORCED CONCRETE

Getting Wasteless Combustion by a combination of McClave Grates or Stokers with Argand Blower

McClave
GRATES
STOKERS
STEAM
BLOWERS

IT is the waste in combustion which makes the fuel bill the biggest item in the operating costs of the boiler house.

It is not possible to utilize every bit of fuel heat. But in the average plant with old firing methods, wasted heat may be reduced from twenty to sixty per-cent with proper combustion.

Fuel economy may be further increased through the use of lower grades of coal. These grades sell for lower prices because few plants are equipped to burn them successfully.

But with the proper grates and adequate blast the very poorest grades may be substituted for the high grades previously used.

Nearly forty years of successful development are back of McClave Grates and Stokers. They are made in types adapted to the burning of all grades of coal.

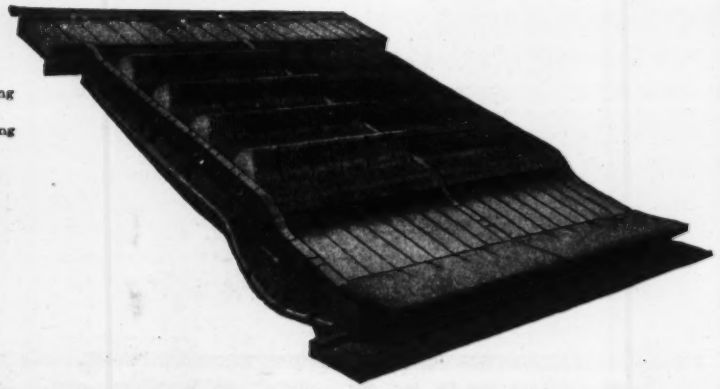
In combination with Argand Blowers they will burn, successfully and economically, anthracite screenings, slack from bituminous coals and lignite, sweepings or coke breeze.

The savings from this single item of the difference in cost between high and low grades of coal, is a very substantial one for every plant owner who is seeking for a new avenue of worth while economies.

Write for more information about McClave Grates, Stokers and Argand Blowers.

McCLAVE-BROOKS COMPANY
Makers of the famous McClave Grates since 1883
SCRANTON, PA.

McCLAVE HAND-FIRED STOKERS
Showing full "kicker" movement (above) and partial "kicker" movement (below)



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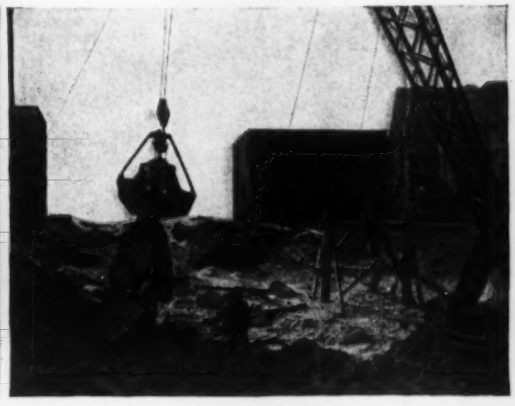
McClave COMBUSTION SYSTEMS *for greater economy*

HAISS



Haiss "PATH DIGGING" Wagon Loaders

have made truck loading absolutely a mechanical proposition. The patented Self-feeding Propeller Blades cut out a path wider than the overall width of the loading machine, and heap up every bucket which passes. The Self-crowding, slow-speed gear keeps these feeding propellers automatically pressed into the material pile. The Self-propelled chassis provides backward and forward drives, just like an automobile. For 1c. worth of power 1½ cu. yds. can be dug and loaded in 1 minute by 1 man. Write for Booklet No. 820.

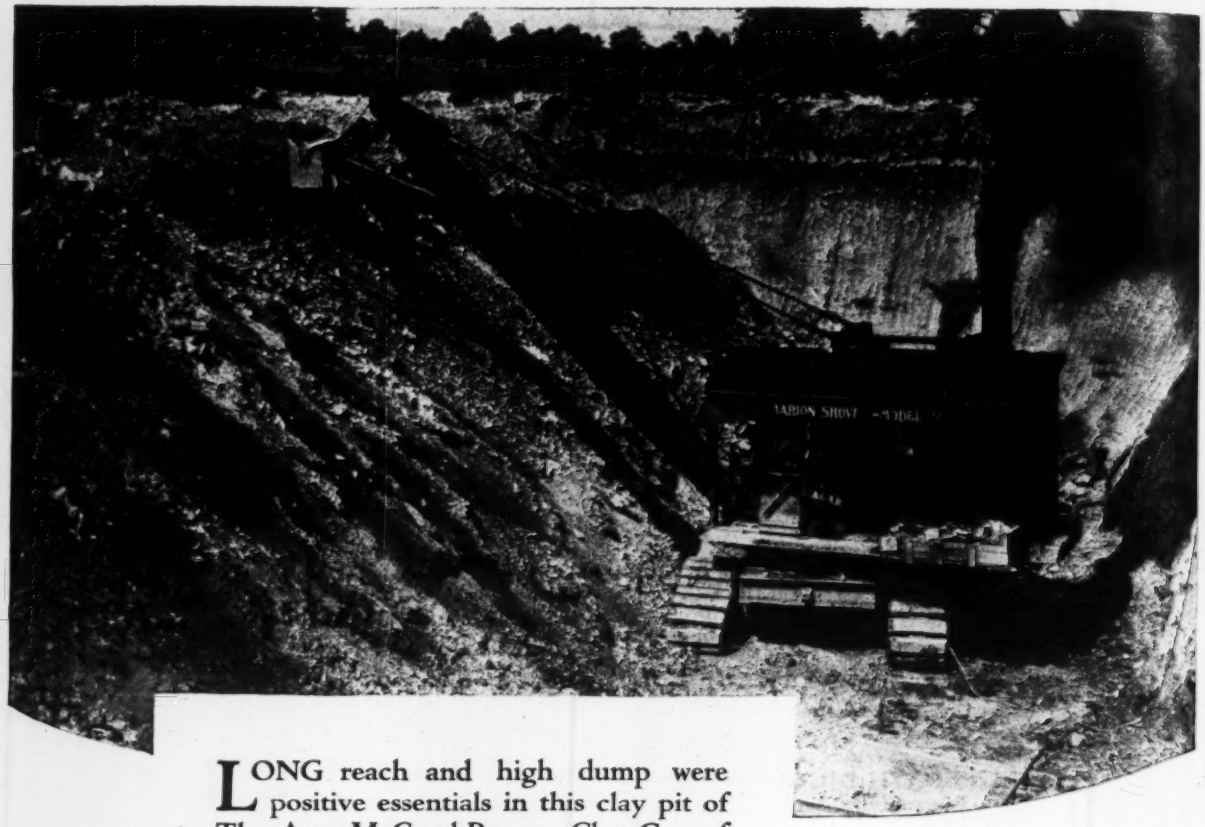
Haiss "HIGH POWER" Clam Shell Buckets

dig deeply into all kinds of bulk material. They operate easily on various types of hoisting structures, derricks, etc. A rope reeve of 1:7 ratio develops the great digging power. Furnished with steel cutting shoes, with replaceable bronze bushings, with cast steel blade arms and braces, rope guards, etc. For long wear, low upkeep and price they have no equal. Write for Booklet No. 719.

Haiss "Portable" and "Self-Propelled" Belt Conveyors

are equipped with the latest improved steel ball-bearing belt rollers, with Four-way tail pulley adjustable bearings, with hand-wheel, head pulley take-ups, with the best 4 ply rubber belting, etc. For material weighing not more than 50 lbs. per cu. ft. a self-feeding device is attached. High or low cleats furnished. Revolving self-propelled types also manufactured. Write for Booklet No. 321.

The Geo. Haiss Mfg. Co.
140th St. and Rider Ave., New York, N. Y.



LONG reach and high dump were positive essentials in this clay pit of The Ayer-McCarel-Reagan Clay Co., of Brazil, Indiana. Their operations were of such a nature that they required equipment of *more than ordinary* working range.

In the close quarters shown in the photograph this Model 36 was dumping 23 feet above grade. The reach from pivotal center to center of dipper was 37 feet and this reach could be increased 8 feet where necessity required.

If your stripping or loading is of the *unusual* kind, your shovel should be a "Marion."

THE **Marion** STEAM SHOVEL CO.

Established 1884 Marion, Ohio

New York Chicago Atlanta San Francisco

Boise, Idaho, - Clyde Equipment Co.
Billings, Mont., F. B. Connelly Co.
Dallas, - F. B. Wright, Bush Bldg.
Denver, - - - H. W. Moore & Co.
Detroit, W. H. Anderson T. & S. Co.
Vancouver, - - - - - - - - - - - Vancouver Machinery Depot, Ltd.
Montreal, Toronto, - - - - - - - - - - - F. H. Hopkins & Co., Ltd.
Philadelphia, H. L. Cox, 13 & Cherry
Pittsburgh, - - - J. W. Patterson
Portland, - - Clyde Equipment Co.
Salt Lake City, H. W. Moore & Co.
Seattle, - - Clyde Equipment Co.

EVERYWHERE RELIABLE — THE Marion STEAM SHOVEL CO. — ESTABLISHED 1884

130

ECONOMY I

Stone & Webster Plants Lead in Two Industries

THE records of the public utilities commission in one of the great industrial states show that a power station and a gas works designed and built by Stone & Webster have the lowest operating costs in that state.

The power station produces power 16.5% cheaper than its nearest competitor and 26% cheaper than the average of the next ten.

The gas works makes gas 6.3% cheaper than its nearest competitor and 30.4% cheaper than the average of the next ten.

Savings like these will make drastic cuts in the country's fuel and labor bill.

STONE & WEBSTER
INCORPORATED

STONE & WEBSTER CONSTRUCTION SERVICE

NEW YORK, 120 Broadway
CHICAGO, 38 S. Dearborn Street
DETROIT, Book Building
BOSTON, 147 Milk Street
SAN FRANCISCO, Holbrook Bldg.
CLEVELAND, Leader News Bldg.
PITTSBURGH, Union Arcade

OSGOOD 29

For Flexibility in Excavation Work

The *Osgood* 29—1 yard revolving steam shovel is widely used in the lighter class of contracting work such as road grading, cellar excavating, sewer trenching, loading and unloading cars, working in gravel pits, brick and clay yards, stone quarries, mines, etc.

It may be mounted on wide face traction wheels, railroad or continuous tread type trucks, or on specially mounted wide trucks for spanning trenches, ditches, etc.

It embodies all the important features of the big fellows—and may be readily converted into a Crane, Clam shell, or Drag Line Machine.

For all around utility and flexibility of application you cannot beat an *Osgood* 29.

Our General Catalog A-1 will give you complete details on OSGOOD "29" and other sizes. Write TODAY.

Revolving and Railroad Types ¾ to 6 cu. yds.

The Osgood Company
Marion, Ohio

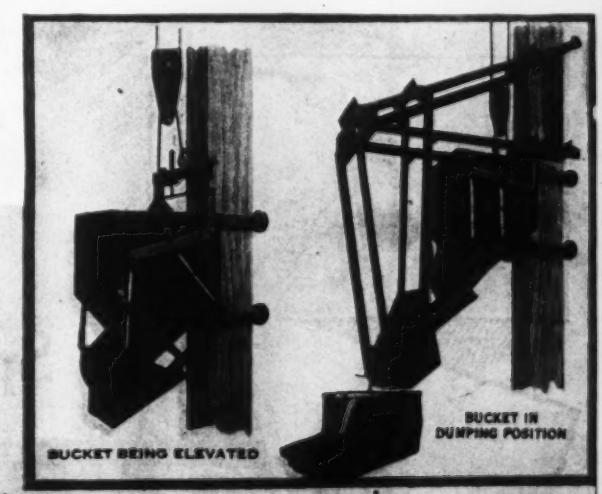
Concrete Elevating Equipment
For One Sack Mixer Work

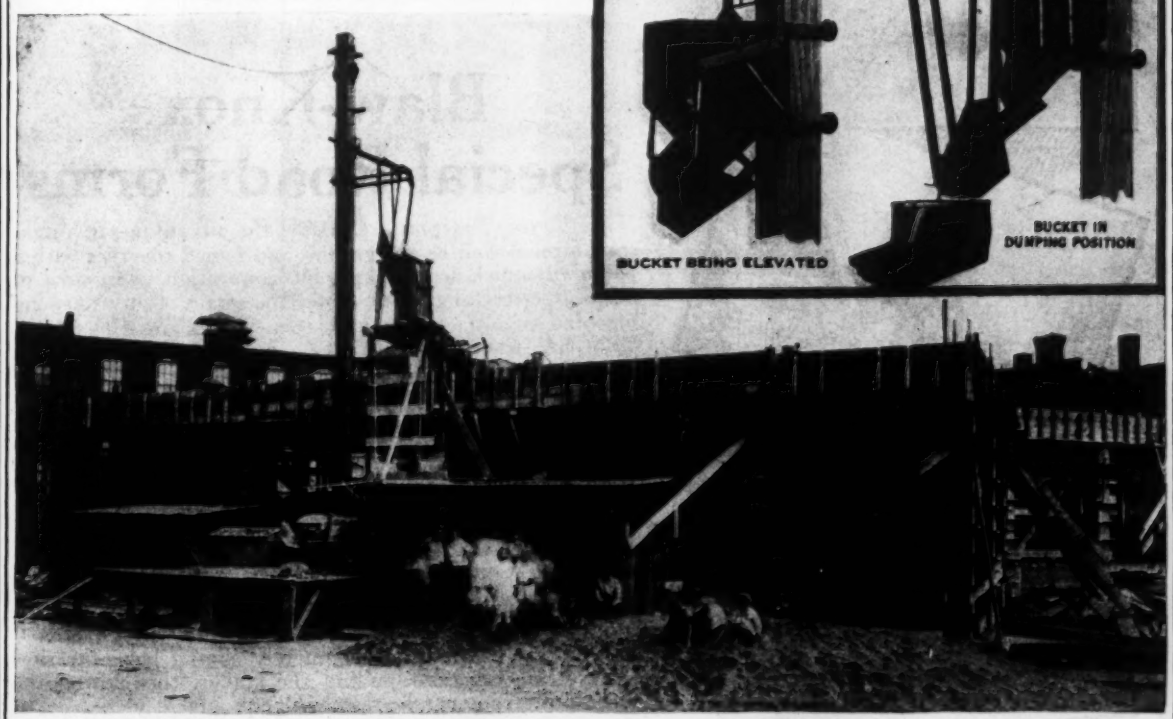
THE Insley Mast Hoist Bucket Plant is equipment designed to handle the output of a one-sack mixer under conditions where the erection of an ordinary hoist bucket tower is not warranted.

These units are doing work on all classes of small concrete construction that warrants investigation upon the part of contractors who have a limited yardage of concrete to elevate and distribute.

INSLEY

CONCRETE PLACING EQUIPMENT
INDUSTRIAL CARS — DUMP BUCKETS
STEEL DERRICKS



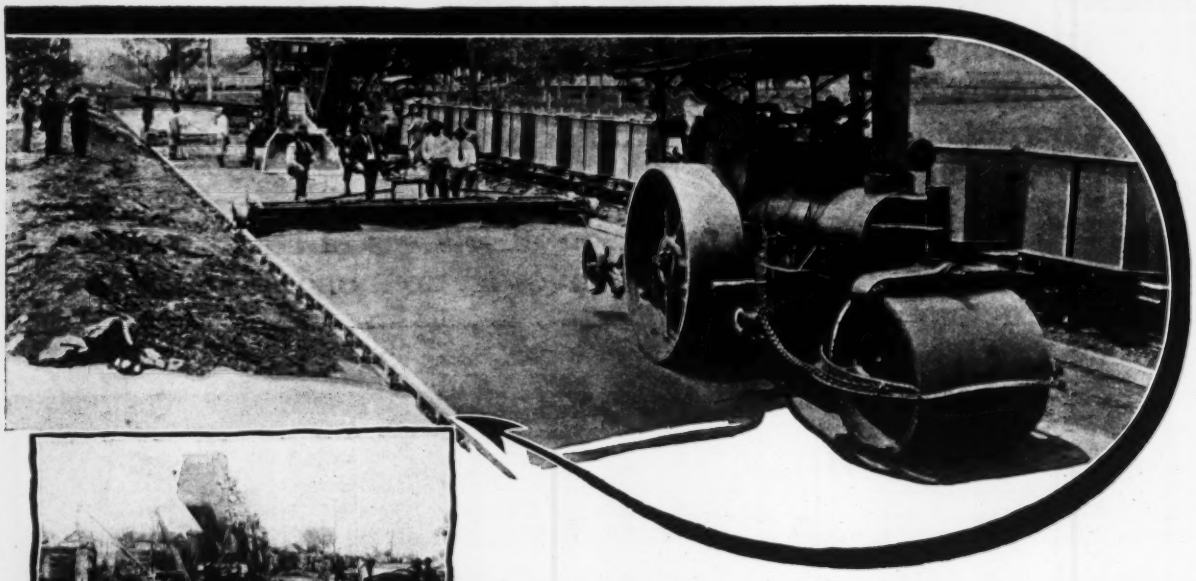


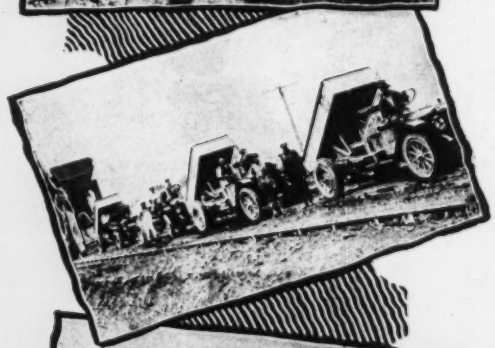
INSLEY MANUFACTURING CO.

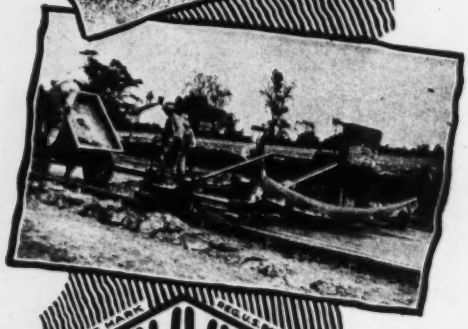
Engineers INDIANAPOLIS, IND. Manufacturers

220

FORMS







TRADE MARK REG. U.S. PAT. OFFICE

BLAW-KNOX

Blaw-Knox Special Road Forms

When Buying Equipment, Consider the advantages of a rigid steel form staked to the ground and joined together with a patented, quick-acting slip-joint connection *guaranteed* to keep in perfect alignment under the strain of any finishing machine manufactured, and then—*BUY BLAW-KNOX SPECIAL ROAD FORMS.*

The slip-joint connection of Blaw-Knox Special Road Forms is an integral part of each rail—made of specially heavy material to prevent damage and jamming at the joints.

Three heavy reinforcing plates have been found to be amply sufficient to bear any weight encountered in service.

Staked to the ground and locked into position by means of wedge shaped keys, these forms cannot slide, shift, nor creep out of alignment.

An added feature—One or more rails can easily be removed from set-up sections to allow passage for trucks, etc., if necessary. This is done by merely sliding back the slip-joint connection and pulling the stakes, then lifting the forms out. They can be reset with equal facility.

Our Catalogue No. 19 tells all about Blawforms for all types of road, street and sidewalk construction. Write for it and place it in your reference library.

BLAW-KNOX COMPANY

PITTSBURGH, PA.
601 Farmers Bank Bldg.

New York-Boston-Chicago-Detroit-Kansas City
Baltimore-Birmingham-San Francisco

Specify a BLAW BUCKET for your crane

BLAW-KNOX

Buy the bucket built for your type of crane—and get your money's worth out of your crane on clamshell bucket work.

Blaw-Knox Dreadnaught Buckets are designed and built to fit the customer's hoisting equipment.

They are absolutely the best bet for any contractor who has a variety of rehandling and excavating work to do. A sturdy, highly developed lever arm type bucket with extremely powerful closing action—the number of sizes in which it is built fits it to all types of cranes, derricks and hoists.

Immediate shipment of any size from ¾ yd. up can be made **from stock.** Stocks are located at convenient shipping points throughout the country.

When in need of a bucket for general all-around purposes—be sure to order a

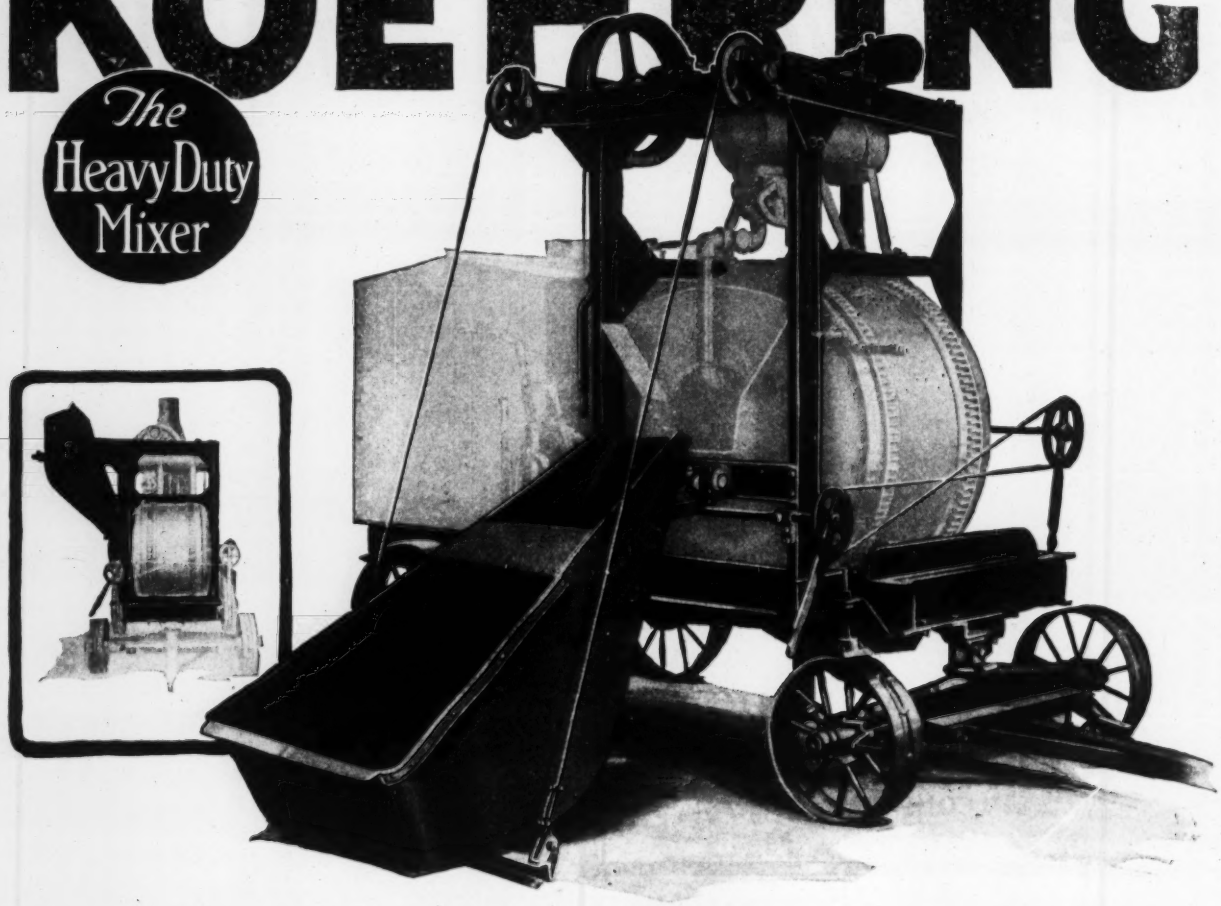
BLAW DREADNAUGHT

BLAW-KNOX COMPANY
PITTSBURGH, PA.
603 Farmers Bank Bldg.
New York · Boston · Chicago · Detroit · Kansas City · Baltimore · Birmingham · San Francisco

Sewer excavation—with a Blaw Dreadnaught

KOEHRING

The Heavy Duty Mixer



Fortified Against the Greatest of Concrete Mixer Strains

WRENCHING strains of a loaded charging skip punish every part of a mixer, unless like the Koehring, the mixer has the super-strong main frame and super-structure, liberally cross-membered, joints machined to perfect fit—strongly gussetted and angle braced.

Koehring frame construction, together with the great saddle casting by which the charging skip is fastened to the frame by means of wide apart bearings which prevent side-sway—these are features of heavy duty construction which trouble proofs work, and insures long service life.

The special Koehring construction which permits the charging skip to pass between cable sheaves gives the skip the high angle charging position which chutes materials into drum in one swift, clean slide.

CAPACITIES

Heavy Duty Construction mixers 10, 14, 21, 28 cu. ft. mixed concrete, steam and gasoline. Ask for catalog—C8.

Pavers: 10, 14, 21, 28 cu. ft. mixed concrete, spout, boom and bucket. Power discharge chute, multiplane traction, loading derrick, steam and gasoline. Ask for catalog—P8.

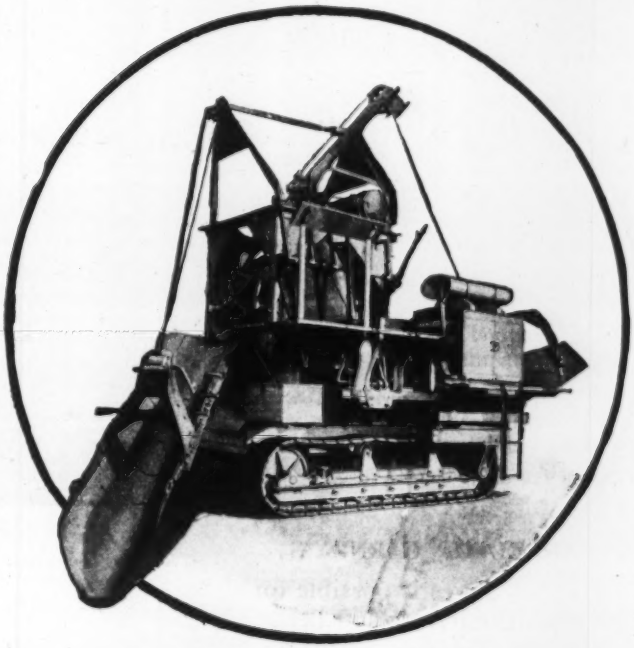
Dandie Light Mixer 4 cu. ft. mixed concrete, gasoline, 7 cu. ft. mixed concrete, steam and gasoline. Low charging platform. Power charging skip or batch hopper, light duty hoist. Ask for catalog—D8.

KOEHRING COMPANY · MILWAUKEE WISCONSIN

ROAD **MULTI FOOTE** PAVER

TRADE MARK REGISTERED

Judge Them By The Company They Keep



And You Will Use No Other As Long As You Are In the Business

Any representative of the Foote Company can demonstrate to your satisfaction the superiority of MultiFoote Pavers both in design and construction.

Then he will ask you to look over the list of users—headed by such contractors as Warren Brothers Co. of Boston, Mass., who bought their first Foote Paver in 1905 and have since given us 26 repeat orders.

The list is convincing, *the big fellows are using them.* 65% of all our sales are repeat orders.

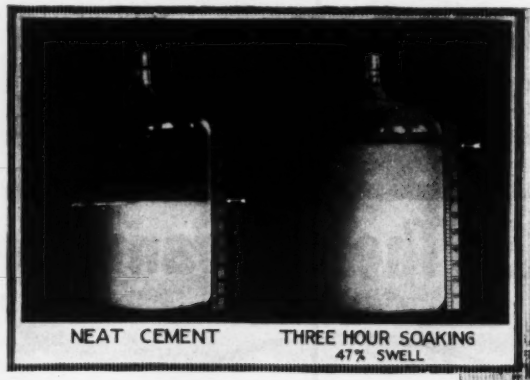
If you will judge the MultiFoote Paver by the company it keeps you will want one—if you judge it by its performance in the field you will want one, or if you judge it by its design and construction you will want one.

Let us tell you more about the MultiFoote Paver. Ask for a Catalog.

General Agents

Foote Concrete Machinery Co., 1241 Mich. Ave., Chicago, Ill.
Edward R. Bacon Co., 51 Minna St., San Francisco, Cal.
Wilcox Brothers, Inc., 30 Church St., New York, N. Y.
E. J. McHarg & Co., 3 Crandall St., Binghamton, N. Y.
Made by Foote Co., Inc., Nunda, N. Y.

Actual photographs of soaking test made on Carney's Cement April, 1921, under supervision of Bricklaying Instructor, Vocational Training Course, Cleveland Public Schools.



AN IMPRESSIVE CEMENT TEST

First bottle contained 7 inches of dry Carney's Cement. Water was then added equal to twice the cement volume.

Second bottle shows result after three hours' soaking. At that time all water was absorbed and cement had reached a height of 10¾ inches; an increase of 47% in volume.

At completion of test the five gallon water bottle was broken, and the swelled cement stood up full height as a cylinder of plastic, jelly-like cement putty.

Coincident with this test another was conducted with Carney's Cement soaking in a full size mortar box with twice its volume of water. The maximum swell after three hours was a cement putty of 50% greater volume than the neat cement.

New Wrigley Building, pride of Chicago, is typical of the fine structures that are continually being laid up in Carney's Cement.

The architects on this building, Graham, Anderson, Probst & White, and the contractors, Lanquist & Illsley, by specifying and using Carney's Cement have protected their good work against the ravages of time.

1,000 BRICKS PER BARREL OF CARNEY'S

This large increase in volume makes it possible for your contractor to lay approximately 1,000 bricks per barrel of Carney's Cement. In other words, for every barrel of cement purchased he actually has a barrel and a half after the soaking process—a 50% saving in first cost of cement alone.

Soaking of Carney's Cement greatly improves its naturally plastic and smooth working qualities and insures the laying of many more brick per day.

It produces a uniformly solid wall, becoming harder than the brick it joins.

It can stand indefinitely after soaking without impairing its exceptional strength and durability, and mortar left in the box over night may be retempered in the morning by simply adding water.

These unusual characteristics are only present in Carney's Cement and are not possible with any other make or mixture.

1 *part Carney's Cement, 3 parts sand, no lime, is "The Bond That Guarantees The Wall."*

CARNEY'S CEMENT COMPANY, Mankato, Minn. Cement Makers since 1883.

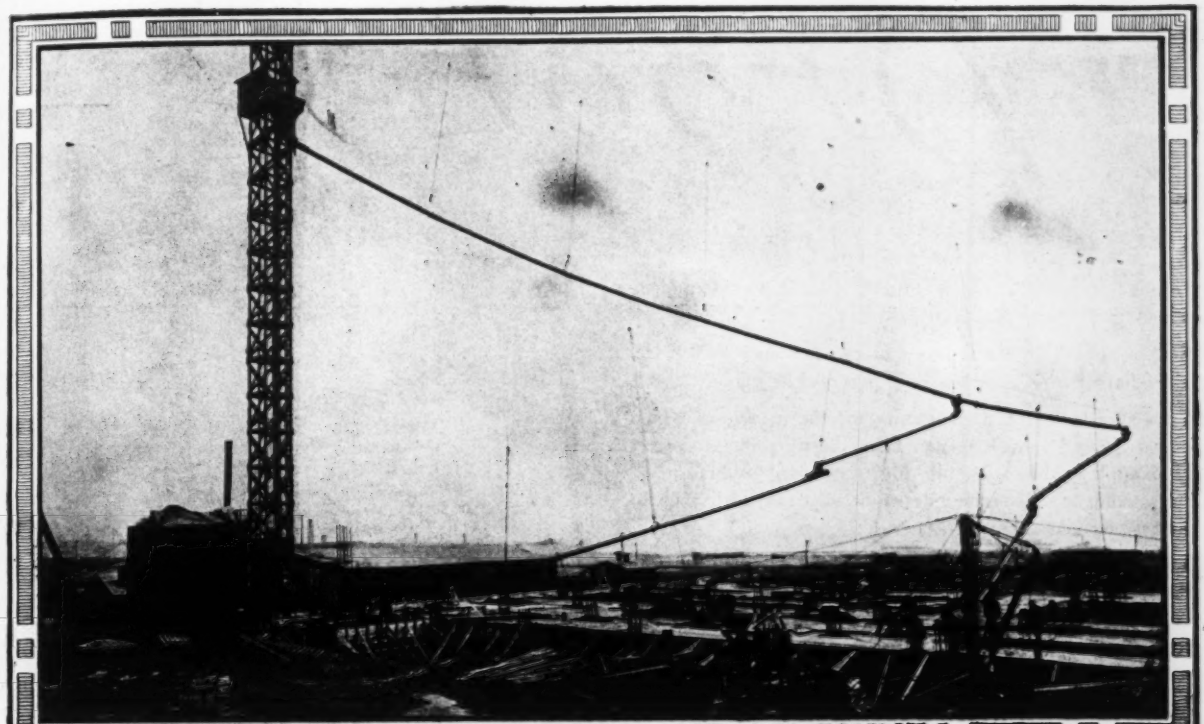
DISTRICT SALES OFFICES:

The Carney's Cement Sales Co. Leader-News Bldg., Cleveland; Chamber of Commerce Bldg., Chicago; Omaha Nat'l Bank Bldg., Omaha; Syndicate Trust Bldg., St. Louis; Atlanta Trust Co. Bldg., Atlanta, Ga.; **Jas. Quinn, Jr.**, Book Bldg., Detroit. **Carney's Cement Co.** Boilers' Exchange, Minneapolis.

CARNEY'S CEMENT

For Brick and Tile Mortar

44192

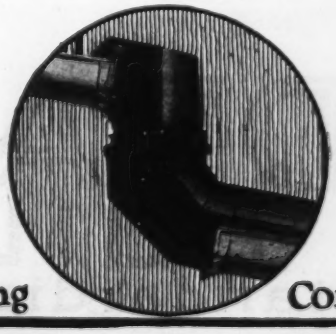


Tufts Company Coca-Cola Job Lakewood Equipped

Although the thermometer was down to zero several times, the construction of the new Coca-Cola building in Baltimore proceeded without delay last winter. The Arthur Tufts Company used Lakewood chuting on this job.

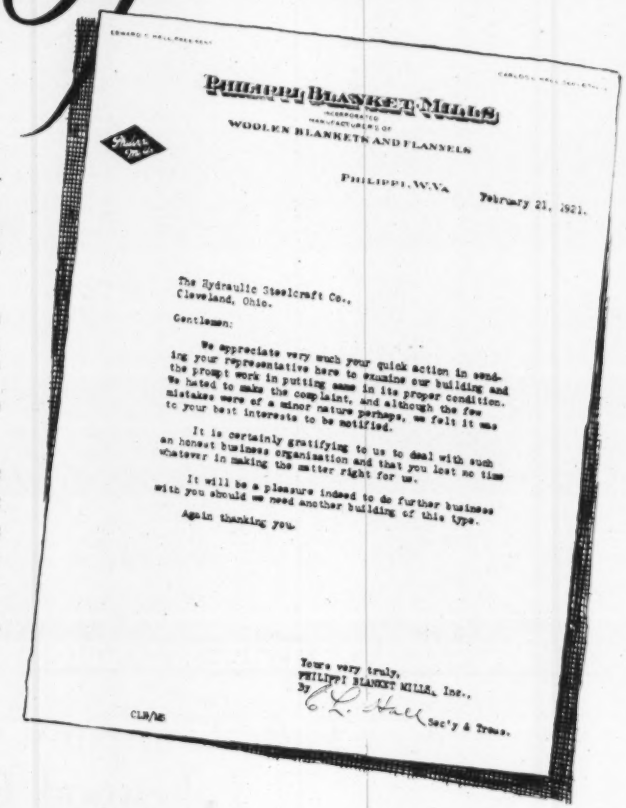
In addition to the economy of Lakewood plant, the contractor saved considerable rope in hanging the chutes. From the load line, which was hung over the top of the tower, single lines of wire rope were dropped and to these were attached the regulation double and single blocks for raising and lowering the chutes.

Let Lakewood help plan your next job.



The Lakewood Engineering Company, Cleveland U.S.A.

Proof



PHILIPPI BLANKET MILLS
INCORPORATED
MANUFACTURERS OF
WOOLEN BLANKETS AND FLANNELS

PHILIPPI, W.Va. February 21, 1921.

The Hydraulic Steelcraft Co.,
Cleveland, Ohio.

Gentlemen:

We appreciate very much your quick action in sending your representative here to examine our building and the prompt work in putting same in its proper condition. We hated to make the complaint, and although the few mistakes were of a minor nature perhaps, we felt it was to your best interests to be notified.

It is certainly gratifying to us to deal with such an honest business organization and that you lost no time whatever in making the matter right for us.

It will be a pleasure indeed to do further business with you should we need another building of this type.

Again thanking you.

Yours very truly,
PHILIPPI BLANKET MILLS, Inc.,
By C. L. Hall Sec'y & Treas.

CLH/MS

Service—a term so much misused that it is often questioned as to value and even existence.

But an act of service is proof of the existence of service. The character of that service is proof of its value.

Thru our belief in, and practice of, the principles which make service possible we have been able to serve. Hydraulic business is built on frankness, "human-ness" and confidence. It is our desire at all times to live up to and strengthen these principles.

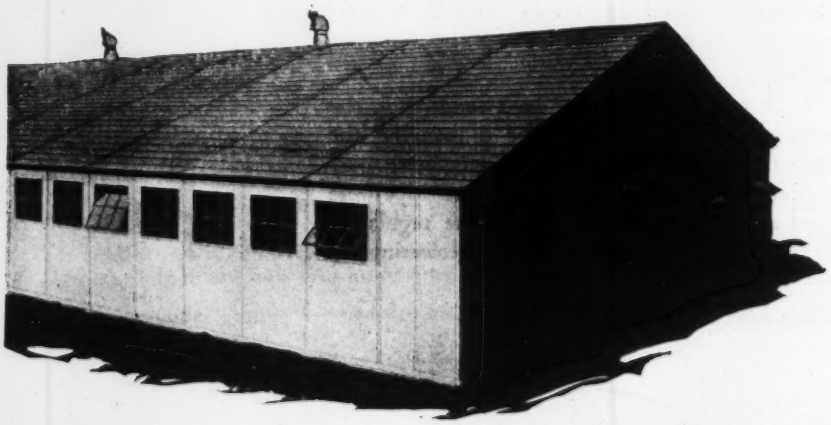
Consequently, we take great pride in this tribute from the Philippi Blanket Mills, which illustrates a Hydraulic principle that anything which is not right will be made right so that it will satisfactorily serve the purpose for which it is bought.

THE HYDRAULIC STEELCRAFT COMPANY
of THE HYDRAULIC STEEL COMPANY
CLEVELAND, OHIO

Hydraulic Steel Buildings are suitable for practically any one-story structure.

Branch Sales Offices:

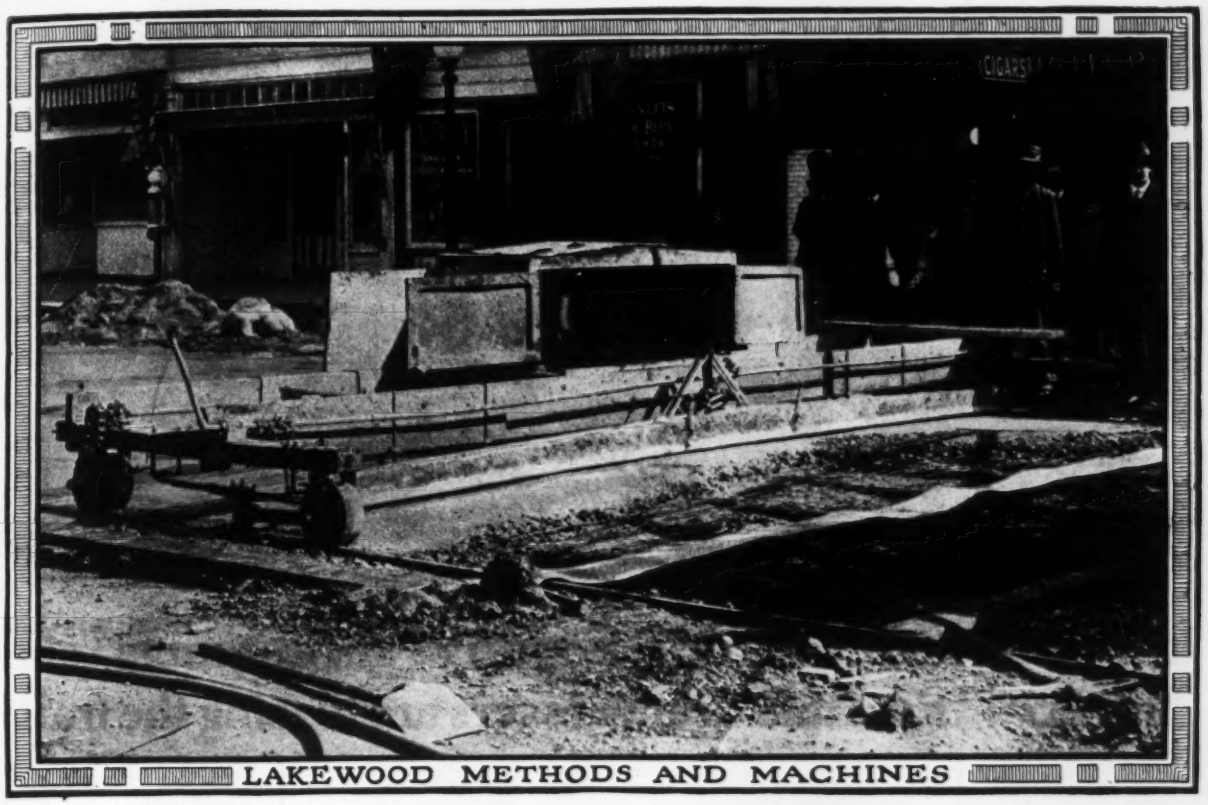
New York Singer Building	Chicago Fisher Building	Detroit Book Building	St. Louis Commercial Building
Atlanta Rhodes Building	Richmond, Va. American National Bank Building		Philadelphia Land Title Building
Indianapolis Public Savings Building	Memphis 1244 So. Orleans St.		Dallas 1806 Main Street



Salient Features

Quick Erecti
Strength—All Steel
Permanency—
(rust-resisting "HY-COP" sheets)
Portability
Fireproof
Low Cost
Immediate Shipment
High Salvage Value

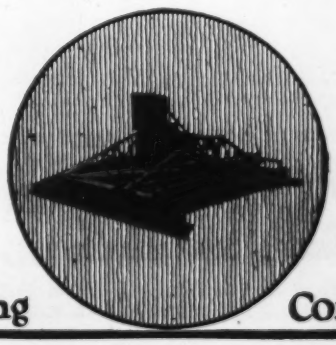
HYDRAULIC
STEEL BUILDINGS
Standardized



Thirty Miles of Road to Its Credit— and Still Going Strong

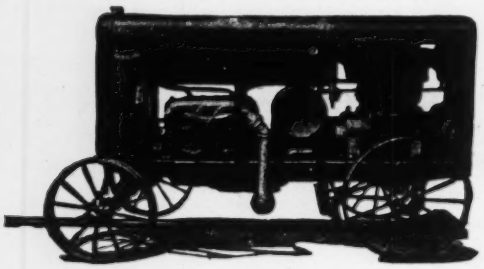
Since it was first put to work in 1916, this early model of the Lakewood Finisher has been used each year. It has over 30 miles of road to its credit, and is still in use in San Luis Obispo on street work.

This first machine is crude when compared to the newer models. Since 1916 many improvements have been made. One fundamental, however, has not been changed—the ability of Lakewood Finishers to give long service under hard usage.



The Lakewood Engineering Company, Cleveland, U.S.A.

In the mountains or rocky country "Jackhamers" and "Imperial" Portable Compressors are blazing the trails



"Imperial" Portable Compressors
Gasoline Engine Driven

45 cu. ft.
118 cu. ft.
210 cu. ft.

Electric Motor Driven
45 cu. ft.
118 cu. ft.

When State Highway Commissions and countless contractors rely on "Imperial" Portables for their air they must have dollars and cents reasons.

They have realized that stationary compressor installations involve too many long, leaky and inefficient air lines. The compressor should move with the work—be as portable as the "Jackhamer" drills.

"Imperial" Portable Compressors have largely replaced the unwieldy permanent installations. Compressor, driven by tractor type gasoline motor, air receiver, fuel tank, radiator cooling system and accessories, are all mounted on a sturdy steel frame. The complete self-contained plant can be drawn to the work by team, truck or tractor, and **makes your air where you use it.**

Ingersoll-Rand Company

General Offices: 11 Broadway, N. Y.

Joplin	Cleveland	Boston	St. Louis
Butte	Pittsburgh	El Paso	Chicago
Juneau	Birmingham	New York	New Orleans
Duluth	Los Angeles	Knoxville	San Francisco
Dallas	Detroit	Scranton	Salt Lake City
Houghton	Denver	Seattle	Philadelphia

533 C

Ingersoll-Rand

Rotators Are "Smooth-Running"

Bill has sent you his picture from Australia to show you how smoothly his "Rotator" really runs.

Bill is 7 years old and weighs 56 lbs.

The Rotator he is operating weighs 38 lbs.

Bill is drilling a 2 ft. hole, in hard sandstone at the Noonan Quarry at Randwick, New South Wales.

The drill is working under full pressure, (note dust around the hole). The photograph (unretouched) shows almost no vibration, as shown by the sharpness of Bill's hands, of the hose, and of the drill itself.

Bill illustrates one feature of Rotator popularity.

This smooth action is made possible by the careful designing, the close working fits and the accuracy with which Rotators are machined and assembled. All parts are made from special alloy steels, heat treated, hardened and ground to exact size. Limit gauges insure perfect interchangeability.

Steel shanks of improper length often cause excessive vibration. Be sure that your shanks are exactly 3¼ in. long, and Bill or any other youngster can run the Rotator easily.

Ask for Bulletin 470J.

DOMESTIC SALES OFFICES

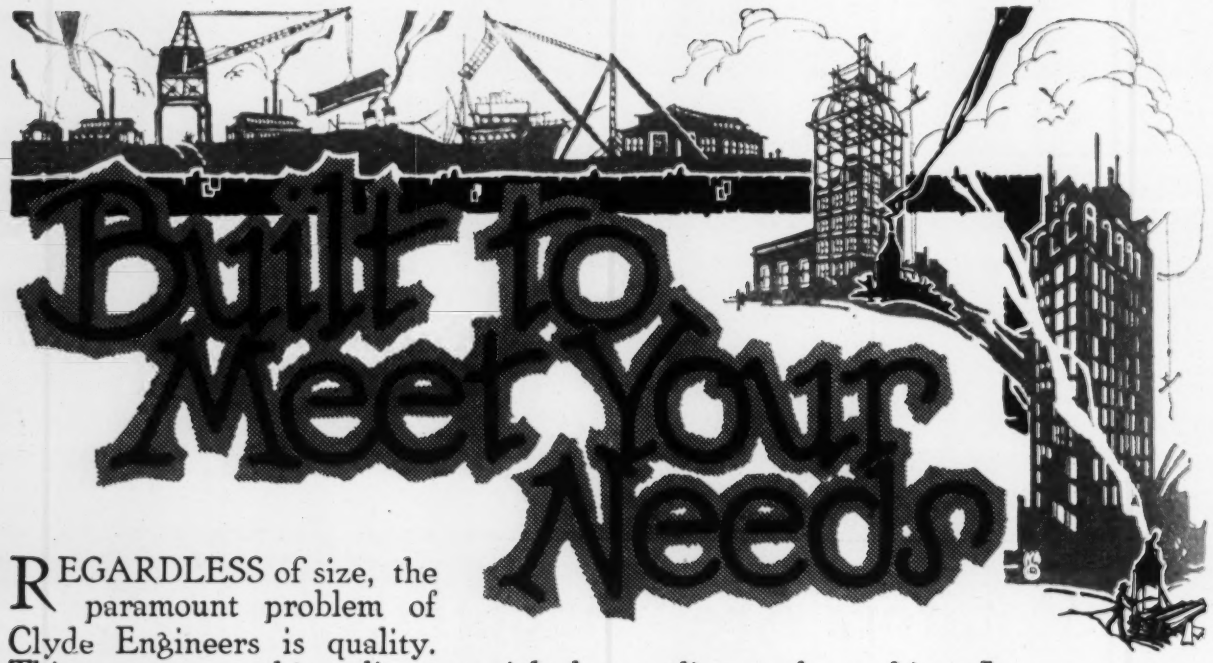
Birmingham, Boston, Butte, Claremont, N. H., Cleveland, Dallas, Denver, Duluth, El Paso, Huntington, W. Va., Joplin, Juneau, Knoxville, New York, Pittsburgh, St. Louis, Salt Lake, San Francisco Spokane.

COMPRESSORS AIR LIFT DIAMOND DRILLS SHARPENERS FORGES
FORGE HAMMERS COAL CUTTERS ROCK DRILLS DRILLING CONTRACTORS

SULLIVAN MACHINERY COMPANY
124 So. Michigan Ave. Chicago.

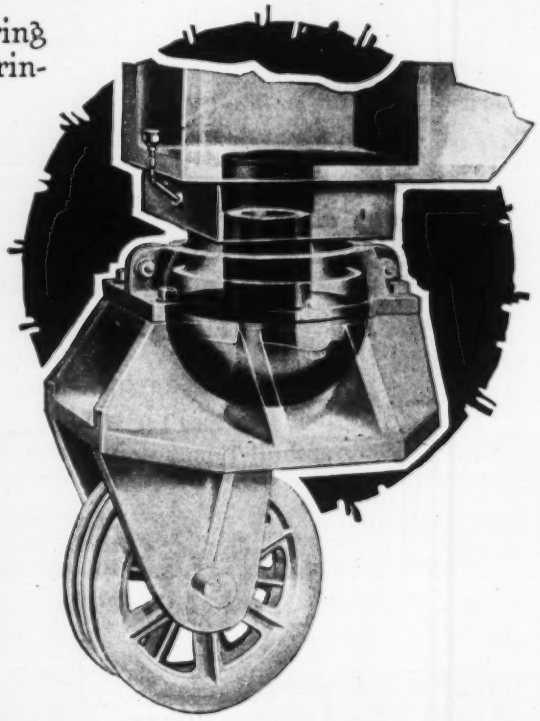
FOREIGN SALES OFFICES

Algiers, Brussels, Calcutta, Christiania, Durban, Natal, Havana, Lima, London, Madrid, Mexico City, Paris, San Juan, Santiago, Shanghai, Sydney, N. S. W., Tokyo, Toronto, Tunis, Turin, Vancouver.



REGARDLESS of size, the paramount problem of Clyde Engineers is quality. This means not only quality materials, but quality workmanship. It means also the perfection of many mechanical features on both hoists and derricks which admittedly have many advantages.

Among the list is the renewable double bearing ball and socket base. This consists of three principal parts, the step, the step bearing and the mast bottom casting.



All tilting takes place on the ball of the step bearing while all turning takes place on the flat upper surface. This gives continually a full flat bearing surface for turning the mast, regardless of the angle at which it is set. Perfect lubrication is provided.

Write for illustrated literature on any part of the Clyde line. And as always, the Clyde Construction Engineers are at your service.

Clyde Iron Works Sales Company

DULUTH, MINN., U. S. A.

Sole Distributors for Clyde Iron Works

Branch Offices and Warehouses:

NEW YORK 141-149 Centre St.	NEW ORLEANS 309 Magazine St.	SEATTLE 542 First Ave. So.
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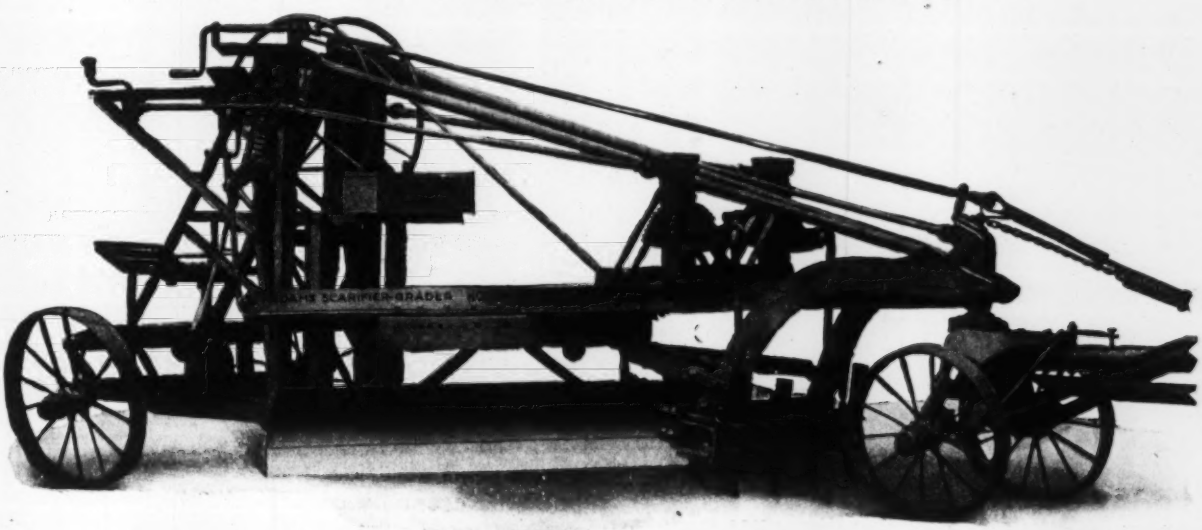
Quality Equipment

Adams Scarifier-Grader No. 8-A

For Scarifying and Grading Old Gravel, Stone or Macadam Roads and Streets. Scarifies and Grades at the Same Time or Scarifier or Blade May Be Used Independently



Trade Mark

Reg. U. S. Pat. Off.

Adams Graders are built in the following sizes for either animal or tractor power:

- ☐ 12-ft. Blade.
- ☐ 10-ft. Blade.
- ☐ 8-ft. Blade.
- ☐ 7-ft. Blade.
- ☐ Scarifier-Grader.

Check the ones you are interested in, write name and address in margin and mail for complete information.

CONTRACTORS: Adams Scarifier-Grader No. 8-A scarifies old roads and, in the same operation, moves the material outward preparatory to laying the concrete. After the concrete is set, the blade is used independently to cut the side ditches and build up the shoulders to specifications. It will cut your grading costs surprisingly.

ROAD AND STREET OFFICIALS: Adams Scarifier-Grader No. 8-A rebuilds old gravel, stone and macadam roads as good as new without new material. Scarifier cuts into bumps and ridges and blade, in same operation, regrades the road into smooth, perfect condition. There's no other machine or method that can do this work as well or at such low cost.

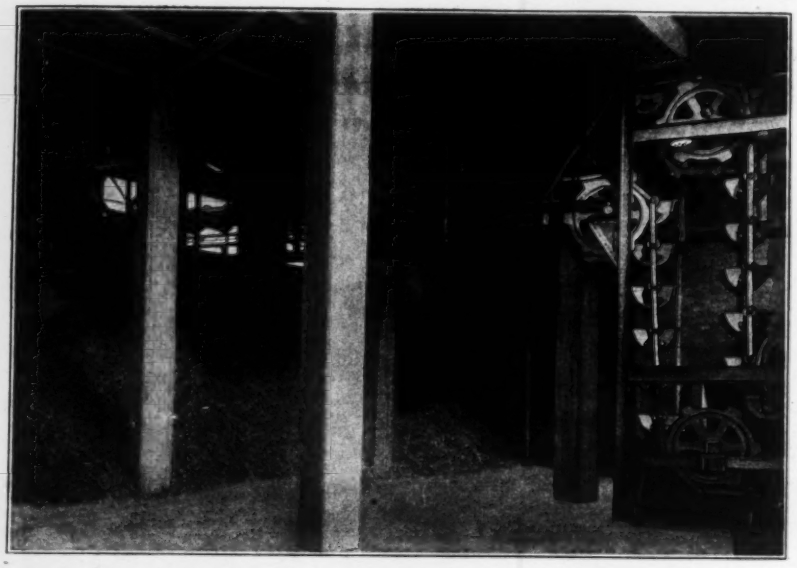
Adams Scarifier-Grader No. 8-A is the last word in combination scarifying and grading machines. It is far in advance of any other scarifier-grader because it has the Adjustable Leaning Wheel feature which marks the greater efficiency and economy of all Adams Graders. Has 8 ft. blade. Power required: 18 Drawbar H.P. or more.

Send for descriptive bulletin today—Use the coupon

J. D. Adams & Co., Indianapolis, Ind.

Adjustable Leaning Wheel Graders, Road Maintainers, Road Patrols, Scarifiers, Drags, Scrapers, Plows, etc.

ADAMS ADJUSTABLE LEANING WHEEL GRADERS



WEBSTER Equipment

The true economy of a mechanical conveying system should be measured not only by the extent to which labor can be conserved but also by the volume of work it can accomplish when, because of heat or cold—or for any other reason—hand labor fails. These features cannot logically be overlooked by any industry which handles raw or finished products in quantity, but should be the basis of judging the necessity for a conveying system, as the saving thus earned forms a permanent economy, and the equipment is a tangible asset.

As the product of a pioneer in conveying machinery Webster equipment has long been known for its exceptional service life. The dominant motive of every Webster engineer is to maintain this high standard, and how well the task has been accomplished is daily demonstrated by actual performance in hundreds of successful installations.

WEBSTER

THE WEBSTER MFG. COMPANY

4500-4560 CORTLAND STREET

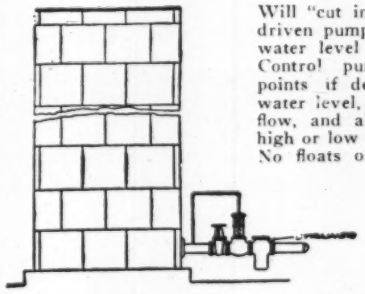
CHICAGO

FACTORIES CHICAGO AND TIFFIN, OHIO. SALES OFFICES IN PRINCIPAL CITIES

If you are using motor driven pumps and want to get automatic control, the way to get it is to install

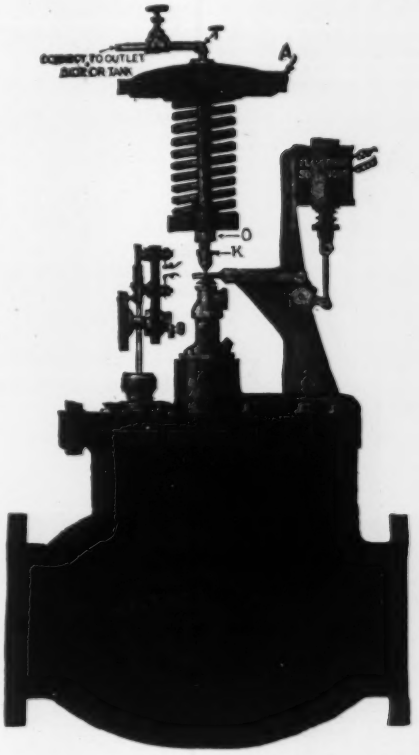
GOLDEN-ANDERSON
Patent Automatic Cushioned

"Stop-Starter Electric"
Controlling Altitude Valves



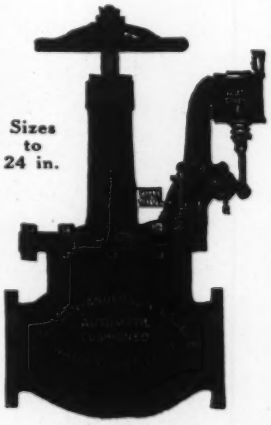
Will "cut in" or "cut out" one or more motor driven pumps. Actuated by the fall or rise of water level in standpipes, tanks or reservoirs. Control pumps automatically, from distant points if desired. By maintaining a constant water level, they stop water waste due to overflow, and also all unnecessary pumping. For high or low pressure. Air and water cushioned. No floats or fixtures. No water hammer or shock. No metal-to-metal seats. Solenoid furnished for alternating or direct current. Especially adapted for railroads, waterworks and industrial plants.

Sizes to 24 in.



See how they are put on. Very simple!

Golden-Anderson
Patent Cushioned Water Service Valves



Sizes to 24 in.

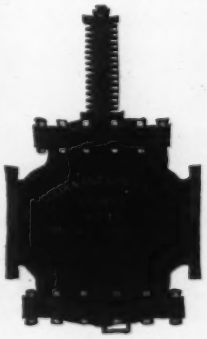
1. Give instant control of the water distribution from the pumping plant in case of fire or other emergency.
2. Can be opened or closed by electricity by closing a small switch for a few seconds only. Thus no current is wasted.
3. Can be provided with either d. c. or a. c. solenoid as currents require.
4. Cushioned in opening and closing by both water and air. Positively operate without water hammer, surging, sticking of other trouble. Can be closed by hand like any ordinary valve.

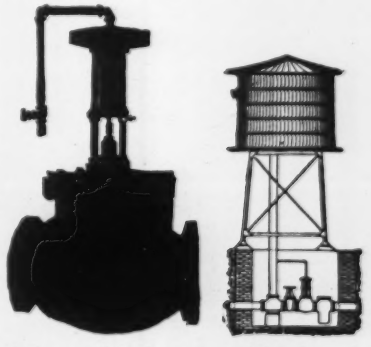
"Hosts of References"
"Every valve with an absolute guarantee"

Golden-Anderson
Patented Cushioned Automatic Controlling Altitude Valves

For Automatically Maintaining Uniform Stage of Water in Tank, Reservoir or Stand-pipes. Doing Away with the Annoyance of Floats or Fixtures. Inside or Outside. Especially Adapted for Water Works and Railroads. "Three Ways of Closing These Valves."

1st—Automatically by water.
2nd—By Electricity, if desired.
3rd—By Hand.





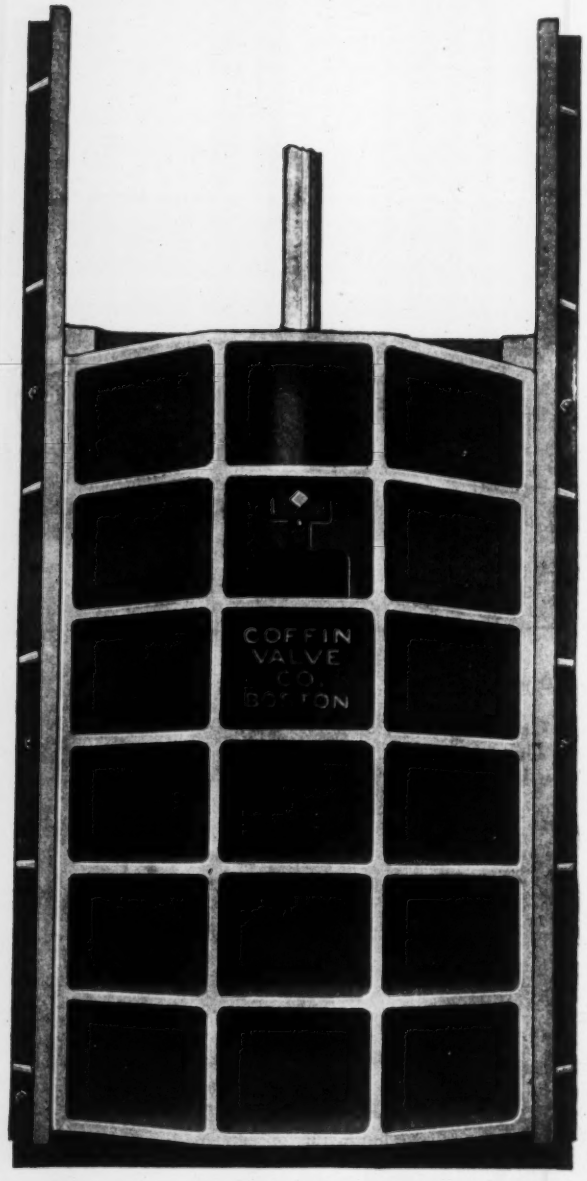
Golden-Anderson Pat.
Automatic Cushioned Water-Regulating Valves

1. Maintain an absolutely constant reduced water pressure regardless of pressure fluctuations on the initial side.
2. Perfectly cushioned both in opening and closing. No metal-to-metal seating. No sticking or chattering.
3. Absolutely self-contained. No auxiliary valve or by-pass is necessary.
4. Once adjusted, no further attention is required.
5. Sizes to 24 inches.

GOLDEN-ANDERSON VALVE SPECIALTY COMPANY
1202 Fulton Building, Pittsburgh, Pa.

COFFIN VALVE COMPANY,

Makers of the Largest Sluice and Gate Valves in America.



A standard heavy type of sluice gate for use under high heads, where the pressure is always in one direction. No Wedges.

Gate shown 42 in. x 72 in. for 100 ft. face pressure.

Check Valves
Flap Valves
Foot Valves
Sewer Gates

Office and Works, Neponset, Suburb of

BOSTON, MASS.

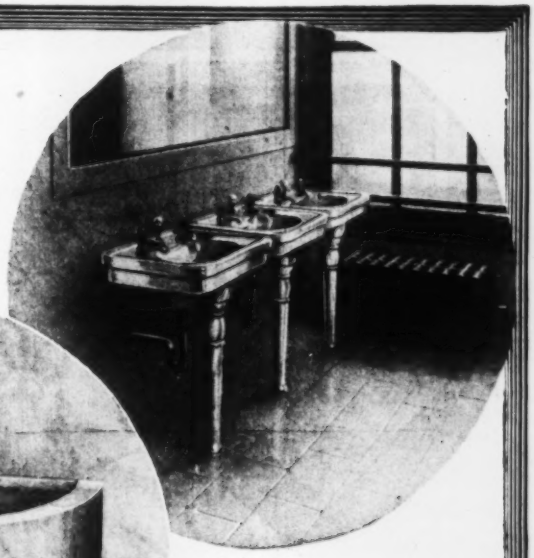
Sluice Gates
Gate Valves
Butterfly Valves
Fire Hydrants

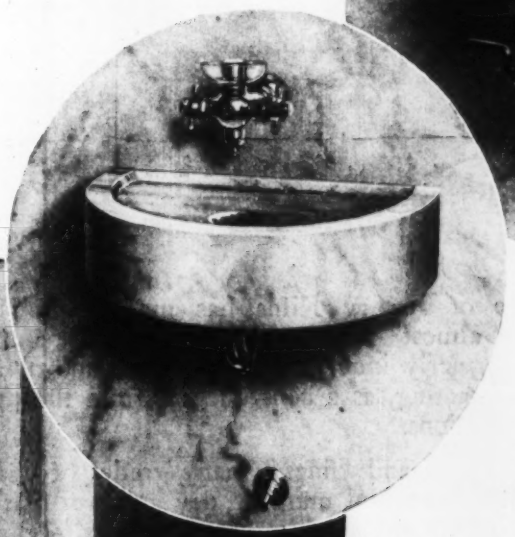
REPRESENTATIVES:

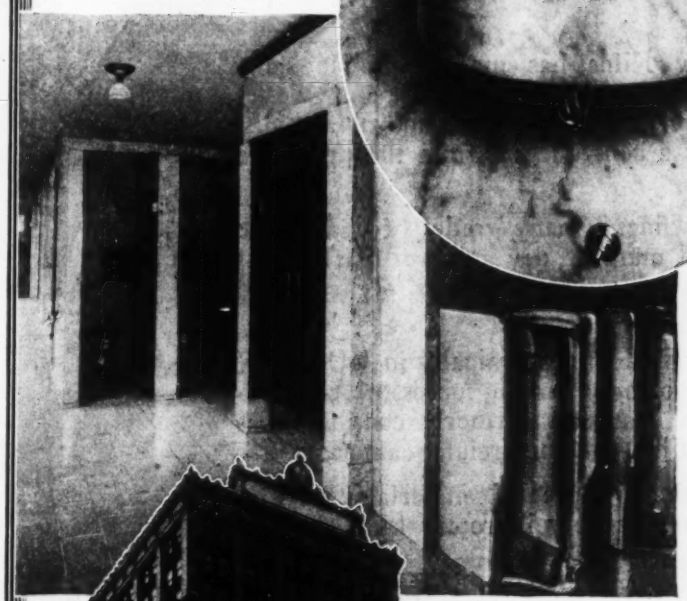
New York City: C. W. Bergen & Co., 256 Broadway.
Philadelphia, Pa.: DeHuff & Hopkins, Morris Building.
Cleveland, Ohio: Tomlinson Steam Specialty Co., 1597 St. Clair Ave.
San Francisco, Cal.: Theo. F. Dredge, Monadnock Building.
Chicago, Ill.: Evans-Bliss Co., 118 N. La Salle St.
Toronto, Ont., The Arthur S. Leitch Co., Ltd., 1001 Kent Building

Practical Sanitation

is now recognized as an important factor in the erection of new buildings or the remodeling of those already built.







CRANE

PLUMBING EQUIPMENT

is adaptable to all the various conditions and requirements of modern structures, as is demonstrated in hundreds of buildings throughout the country equipped with Crane Plumbing Fixtures of a quality that stands the test of severe service, and affords comfort and convenience in operation.

1855 — CRANE CO. — 1921

836 South Michigan Avenue
Chicago

Branches in 64 leading cities.

David Whitney Bldg. Detroit, Mich., Graham Burnham & Co., Arch.

VULCAN ROTARY KILNS are overcoming the handicap of waste

The use of Rotary Kilns has made valuable some hitherto almost valueless raw materials and wastes which formerly incurred the cost of removal and disposal, detracting, as a consequence, from the profits on their operations.

Quarry wastes and "fines," many grades of chalk, fine grain limestones and marbles, dry and wet marls, blast furnace dust and certain crumbly ores of iron and copper.

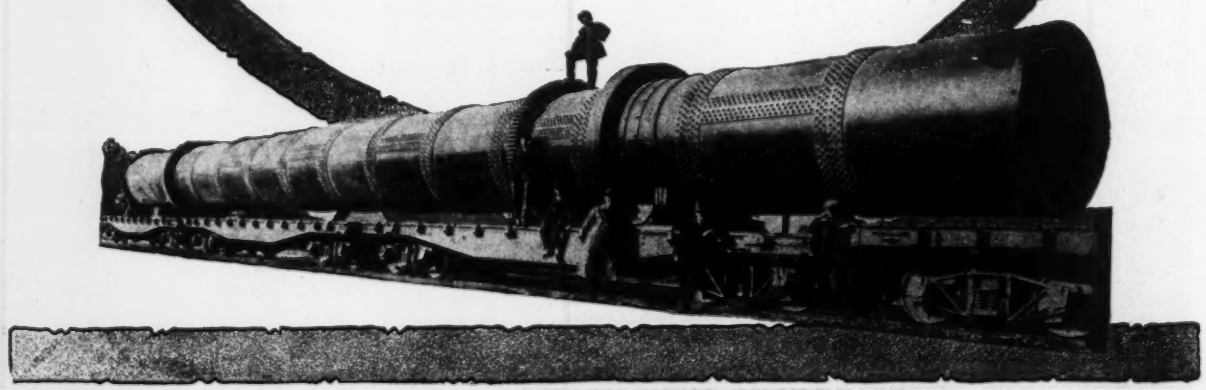
These can all be handled so economically in VULCAN Rotary Kilns as to bring them in successful competition with those raw materials formerly considered as the only ones susceptible to commercial treatment.

And even the originally accepted materials are frequently handled more cheaply in rotary kilns than by the older process.

You may be able to effect some substantial savings by the installation of VULCAN Rotary Kilns.

Correspondence Invited

VULCAN IRON WORKS
ESTABLISHED 1849
1737 Main St., Wilkes-Barre, Pa.



San Francisco Chronicle
May 15, 1921

Redwood Stakes Stand 47 Years

U. S. Engineers Find Little Effect From Ocean

Redwood stakes, driven into the ground along the California coast by the Coast and Geodetic Survey in 1874 still remain in a fair state of preservation to mark triangulation points set forty-seven years ago by Government engineers. The stakes, of two by three undressed lumber, were found by Fremont Morse, Coast and Geodetic Survey engineer, who has been accurately determining the location of the new Navy compass stations along the California coast.

The posts, although unpainted and exposed to ocean storms remain after nearly half a century to guide present-day surveyors in their work. Moss-covered but intact and with the copper nails marking the exact center of the monuments, the stakes are being used to locate the compass stations. Some are a bit worm-eaten, while others are as perfect as the day they were set. One, from Point Arguello, Morse is sending to Washington as a proof of the virtues of California redwood.

THIS IS REMARKABLE—BUT REMCO REDWOOD PIPE

will better this record, as it is made from the same material, carefully selected, and used under conditions more favorable to long life.

The clipping above explains why REMCO pipe lines and tanks which we designed and built more than thirty years ago are still giving perfect service.

It also explains why engineers in all parts of the world are specifying REMCO pipe and tanks for service that must withstand inclement weather and extremes of heat and cold.

All REMCO pipe and tanks are made of clear, air-dried California Redwood, manufactured to minutest precision—and **guaranteed.**

Let us send you prices and engineering data.

REDWOOD MANUFACTURERS COMPANY

1605 HOBART BUILDING, SAN FRANCISCO

1203 LUMBER EXCHANGE BLDG.
CHICAGO

308 EAST THIRD STREET,
LOS ANGELES

Rumors and Facts

Rumor Is Speedy and Very Inaccurate

RUMOR has it The Heltzel Steel Form and Iron Company is unable to make delivery of steel road forms and the like, because of a fire which occurred June 2.

54,000 ft. of Heltzel Steel Forms have been delivered to Pennsylvania contractors alone since June 2, and similar amounts elsewhere.

FACTS are: our Steel Form Department was not affected, and this department is operating day and night.

We positively guarantee shipment any standard size of road, sidewalk or curb forms ten hours after your order is in our hands,

Service is what contractors want, and Heltzel is giving it.

Another fact and a most important one, is that Heltzel Steel Forms on your job mean the minimum amount of delay, and maximum speed in setting and stripping from the finished work

Many State and County Highway Departments, after having experimented with other types of forms, have put Heltzel Forms on their jobs this season. Pennsylvania, Illinois, Ohio and Massachusetts are among them.

More facts for the asking.

You'll want them—they're interesting.

Get Heltzel Blue Book No. 47.

The Heltzel Steel Form & Iron Co.

Warren, Ohio

γεννάω–I Produce!

ONE hundred and forty-four years ago Lavoisier coined the name *Oxygen.*

In choosing the Greek word Γεννάω "I produce," as his main root he had in mind a chemical reaction commonly associated with the gas.

Had Lavoisier been able to foresee the tremendous part that Linde Oxygen is playing in modern industrial development, he would have realized the vast significance of that word Γεννάω "I produce!"

The country over, Linde Oxygen is daily making possible greater production—everywhere it is saving time and cutting costs.

A chain of seventy-five Linde plants and warehouses assures American welders and cutters of a prompt supply of highly pure oxygen—wherever they are, whatever their requirements.

THE LINDE AIR PRODUCTS COMPANY

Carbide and Carbon Building, 30 East 42nd Street, N. Y.

Kohl Building, San Francisco

The Largest Producer of Oxygen in the World

L-503-31

Never compromise with a pumping problem

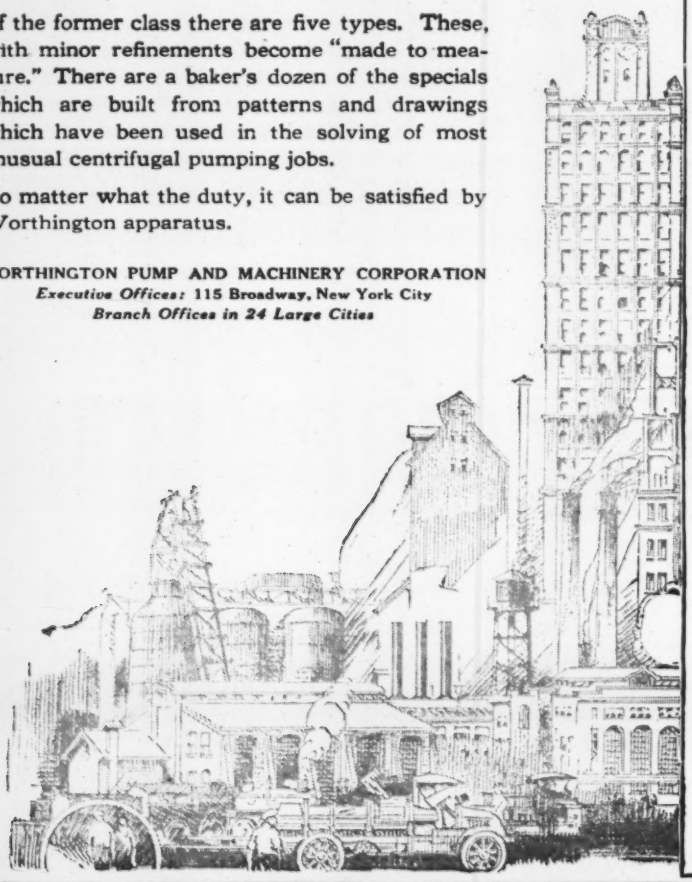
PUMPS—centrifugal pumps in particular should never be bought. They should be specified to fit. The pump salesman—consulting specialist in pumping problems—should always be consulted in order to assure efficient pumping service and not merely a compromise.

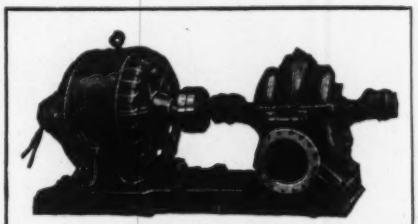
Centrifugal pumps as developed by the Worthington Pump and Machinery Corporation are the crystallization of all the engineering data gathered through many years, into two classes—standard and special.

Of the former class there are five types. These, with minor refinements become "made to measure." There are a baker's dozen of the specials which are built from patterns and drawings which have been used in the solving of most unusual centrifugal pumping jobs.

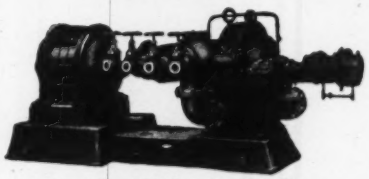
No matter what the duty, it can be satisfied by Worthington apparatus.

WORTHINGTON PUMP AND MACHINERY CORPORATION
Executive Offices: 115 Broadway, New York City
Branch Offices in 24 Large Cities

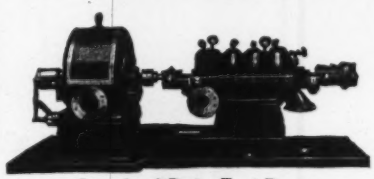




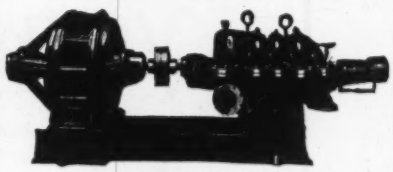
Double Suction Volute Pump



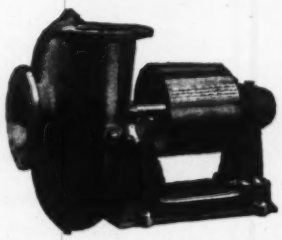
Centrifugal Underwriter Fire Pump



Centrifugal Boiler Feed Pump



Multistage Centrifugal Pump



Belt-driven Open Impeller Centrifugal Pump

B15

PUMPS—COMPRESSORS—CONDENSERS—OIL & GAS ENGINES—METERS—MINING—ROCK CRUSHING & CEMENT MACHINERY

WORTHINGTON

Deane Works, *Holyoke, Mass.*
Blake & Knowles Works *East Cambridge, Mass.*
Worthington Works *Harrison, N. J.*
Laidlaw Works, *Cincinnati, Ohio.*
Hazleton Works, *Hazleton, Pa.*
Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*

Does it pay you ?

With your turnover uncertain, under present conditions, does it pay to carry a large supply of steel on hand ?

Figure out your yearly expense of carrying stock — add to that the interest on the capital tied up and the difference between its cost and present value. Does it pay ?

Buy for your immediate needs and let Ryerson carry your stock for you. We can ship when you need it.

Write for Ryerson Stock List —the key to immediate steel.

ESTABLISHED 1842 INCORPORATED 1888

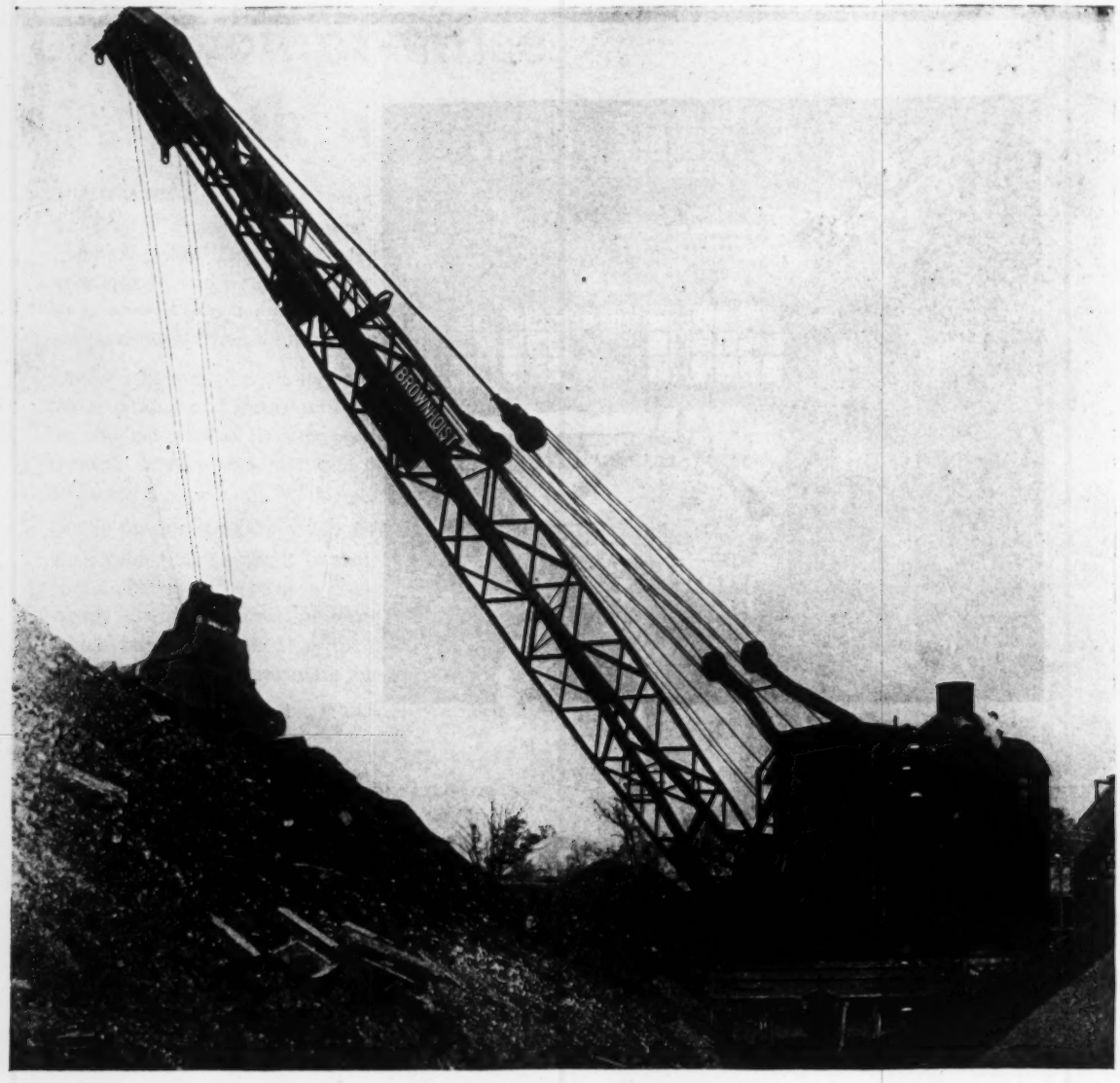
JOSEPH T. RYERSON & SON

CHICAGO ST. LOUIS DETROIT BUFFALO NEW YORK

BRANCH OFFICES CLEVELAND DENVER HOUSTON MILWAUKEE MINNEAPOLIS NEWARK SAN FRANCISCO TOLEDO

RYERSON STEEL-SERVICE

19-E



"Making good on many jobs for us."

"We originally bought a Brownwhoist crane because we believed in its superior qualities, and we have not been disappointed," writes the Trumbull Public Service Corp., of Warren, Ohio. In fact they are so well pleased with their investment that after three years' service, they recently bought another Brownhoist to take care of the increased capacity of their plant.

This crane is only one of thousands of Brownhoists which are making good on many jobs for their owners. Catalog K shows some of these cranes at work. We will be glad to send you a copy of this book.

The Brown Hoisting Machinery Co., Cleveland, Ohio
Branch Offices, New York, Pittsburgh, Chicago, San Francisco and New Orleans

BROWNHOIST

DEDICATED TO QUALITY SINCE 1880

PROPOSALS

For proposals Advertised see the pages immediately following the "Construction News" Section.

WATERWORKS

Bids Close			See Eng. News-Record
July	8	Ottawa, Kan.	June 23
July	8	Redfield, S. D.	June 30
July	9	Harvey Cedars (High Point P. O.), N. J. Adv. June 30.	June 30
July	11	Attica, N. Y.	June 16
July	11	Durant, Ia.	June 30
July	12	Kimball, S. D.	June 23
July	26	Bombay, India	Apr. 18

SEWERS

Bids Close			See Eng. News-Record
July	5	Larchmont, N. Y. Adv. June 23 and 30.	June 30
July	5	Cumberland, Wis.	June 16
July	5	Monroe, Mich.	June 23
July	5	Shelby, N. C.	June 23
July	5	Upper Darby (Phila. P. O.), Pa.	June 23
July	5	Piqua, O.	June 30
July	6	Indianapolis, Ind.	June 16
July	6	Long Island City, N. Y.	June 30
July	8	New York, N. Y.	June 30
July	9	Miamisburg, O. Adv. June 9 to 30.	June 16
July	10	Duluth, Minn.	June 30
July	11	Logan City, Utah	June 30
July	12	Paterson, N. J.	June 30
July	12	Creston, Ia.	June 16
July	15	Larchmont, N. Y. Adv. June 23 and 30.	June 30

BRIDGES

Bids Close			See Eng. News-Record
July	1	Troy, N. Y. Adv. June 9 to 30.	June 9
July	4	Montreal, Que.	June 30
July	5	West Chester, Pa.	June 9
July	5	Clarksburg, W. Va.	June 16
July	5	Grafton, N. C.	June 23
July	5	Cortez, Fla.	June 23
July	5	Flushing, Mich.	June 23
July	5	Eureka, Kan.	June 30
July	6	New Jersey Adv. June 23 and 30.	June 23
July	6	Orangeburg, S. C.	June 30
July	8	Wisconsin Rapids, Wis.	June 16
July	11	Pikeville, Ky. Adv. June 9 to 30.	June 9
July	11	Catskill, N. Y.	June 23
July	14	Philadelphia, Pa. Adv. June 30.	June 30
July	15	Topeka, Kan.	June 30
July	16	Manchester, N. H.	June 30
July	22	Duluth, Minn.	June 23
Sept.	7	Kingman, Kan.	June 30

STREETS AND ROADS

Bids Close			See Eng. News-Record
July	4	Nova Scotia	June 30
July	5	Shreveport, La. Adv. June 16 to 30.	June 16
July	5	Shreveport, La. Adv. June 9 to 30.	June 9
July	5	New Orleans, La.	June 16
July	5	Plainfield, N. J.	June 16
July	5	Victor, N. Y. Adv. June 23 and 30.	June 23
July	5	Boonton, N. J. Adv. June 23 and 30.	June 23
July	5	California	June 23
July	5	Booneville, Mo.	June 23
July	5	Buffalo, N. Y.	June 23
July	5	Akron, O.	June 23
July	5	St. Paul, Minn.	June 23
July	5	Bradentown, Fla.	June 23
July	5	Longmont, Col. Adv. June 23 and 30.	June 30
July	5	Palatka, Fla.	June 30
July	5	Shawano, Wis.	June 30
July	5	St. Paul, Minn.	June 30
July	6	Long Island City N. Y.	June 30
July	6	Washington N. C.	June 16
July	6	Belvidere, N. J. Adv. June 16 to 30.	June 16
July	6	New Mexico	June 16
July	6	Dade City, Fla.	June 16
July	6	New York Adv. June 23 and 30.	June 23
July	6	Little Valley, N. Y.	June 23
July	6	Dayton, O.	June 23
July	6	Alabama	June 23
July	6	Burnett, Tex.	June 30
July	6	San Luis Obispo, Cal.	June 30
July	6	Thompson Falls, Mont.	June 30
July	6	Modesto, Cal.	June 30
July	6	Sesser, Ill.	June 30
July	7	El Monte, Cal.	June 23
July	7	Abbeville, S. C.	June 23
July	7	Montreal, Que.	June 23
July	7	Brenham, Tex.	June 30
July	8	Brownstown, Pa.	June 23
July	8	Waxahachie, Tex.	June 23
July	8	Tennessee	June 23
July	8	Ilion, N. Y. Adv. June 30.	June 30
July	8	Middletown, N. Y. Adv. June 23 and 30.	June 30
July	8	Beverly, N. J.	June 30
July	8	Buffalo, N. Y.	June 30
July	9	Gonzales, Tex.	June 23
July	9	Lambertville, N. Y. Adv. June 23 and 30.	June 30
July	9	West Allis, Wis.	June 30
July	11	Kissimmee, Fla. Adv. June 16 to 30.	June 23
July	11	National City, N. J.	June 16
July	11	Trinidad, Col.	June 30
July	11	Canyon City, Tex. Adv. June 23 and 30.	June 30
July	11	Los Angeles, Cal.	June 30
July	11	California	June 30
July	11	Harrisville, W. Va.	June 30
July	11	Beattyville, Ky.	June 30
July	12	Albert Lea, Minn.	June 23
July	12	St. John, Mich.	June 30
July	12	Holly, Mich.	June 30
July	12	Pontiac, Mich.	June 30
July	13	New York Adv. June 23 and 30.	June 30
July	13	Washington, N. J. Adv. June 23 and 30.	June 30
July	13	Mason, Mich.	June 30
July	14	Port Huron, Mich.	June 30
July	14	Adrian, Mich.	June 30
July	14	Charlotte, Mich.	June 30
July	14	Sturgis, Mich.	June 30
July	14	Maine	June 30
July	15	Palestine, Ill.	June 23
July	15	Carbondale, Ill.	June 23
July	15	Flint, Mich.	June 30
July	18	Nevada, Mo.	June 30
July	19	Adrian, Mich.	June 30
July	20	Boone, Ia.	June 30
July	22	Duluth, Minn.	June 23
July	26	Alabama	June 23
Aug.	1	Highland, Ill.	June 30

EXCAVATION AND DREDGING

Bids Close			See Eng. News-Record
July	5	Cleveland, Miss.	June 30
July	11	Milwaukee, Wis.	June 23
July	13	Traverse City, Mich. Adv. June 30.	June 30

INDUSTRIAL WORKS

BUILDINGS

Bids Close			See Eng. News-Record
July	2	Milwaukee, Wis.	June 30
July	5	Redfield, S. D.	June 23
July	5	Chatfield, O.	June 30
July	5	Channing, Mich.	June 30
July	5	Wickliffe, Ky.	June 30
July	5	Arlington, Ill.	June 30
July	5	Norwich, Conn.	June 30
July	5	Morgantown, N. C.	June 30
July	6	Lincoln, Neb.	June 2
July	6	Lincoln, Neb.	June 9
July	6	Terre Haute, Ind.	June 23
July	6	Osceola, Neb.	June 30
July	6	Brighton (Boston P. O.), Mass.	June 30
July	6	Sutherland, Ia.	June 30
July	6	Wyandotte, Mich.	June 30
July	6	Arkansas City, Kan.	June 30
July	7	Cortland, N. Y.	June 16
July	7	Elwood, Ind.	June 23
July	7	Brule, Neb.	June 30
July	8	Robinson, Ill.	June 23
July	8	Phila., Pa.	June 23
July	9	Viroqua, Wis.	June 23
July	9	Lewistown, Mont.	June 30
July	10	Durham, N. C.	June 16
July	11	Janesville, Wis.	June 23
July	11	Burlington, N. J.	June 23
July	11	Appleton Wis.	June 30
July	11	Milton, Pa.	June 30
July	11	Johnstown, Pa.	June 30
July	12	Oswego, N. Y.	June 16
July	12	Norfolk, Va. Adv. June 16 to 30.	June 16
July	12	Middletown, O.	June 30
July	12	Nodaway, Ia.	June 30
July	12	Rapid City, S. D.	June 30
July	14	Fergus Falls, Minn.	June 23
July	14	St. Paul, Ind.	June 30
July	14	Lincoln, Ind.	June 30
July	15	Durham, N. C.	June 16
July	15	Ottumwa, Ia.	June 16
July	15	Kenosha, Wis.	June 16
July	15	Ravenna, O.	June 23
July	15	Richmond, Ind.	June 30
July	15	College Point, Tex.	June 30
July	18	Hartford, Conn.	June 23
July	18	Duluth, Minn.	June 30
July	19	Mansfield, O.	June 30
July	19	Barnum, Ia.	June 30
July	20	Fayetteville, N. C.	June 23
July	20	Sioux City, Ia.	June 30
July	22	Baddock, Pa.	June 23
Aug.	1	Superior, Wis.	June 30

FEDERAL GOVERNMENT WORK

Bids Close			See Eng. News-Record
July	5	Structural Steel, etc. — Wheeling, Va.	June 16
July	5	Breakwater — Galveston, Tex.	June 16
July	5	Shop—Leavenworth, Kan.	June 30
July	6	Fire Alarm System Addition —Puget Sound, Wash.	June 16
July	6	Vestibules—Flint, Mich.	June 23
July	7	Hospital Alterations—Buffalo, N. Y.	June 23
July	8	Post Office—Lima, O.	June 23
July	11	Officers Quarters—Stapleton, S. I., N. Y.	June 23

Bids Close		See Eng. News-Record
July 11	Mechanical Equipment — Stapleton, S. I., N. Y.	June 23
July 11	Buildings—Dawson Springs, Ky.	June 30
July 11	Mechanical Equipments — Dawson Springs, Ky.	June 30
July 11	Sub. Station—Dawson Springs, Ky.	June 30
July 12	Maling Vestibule—Pontiac, Mich.	June 30
July 13	Water System Extension—Puget Sound, Wash.	June 23
July 13	Sanatorium Bldg.—Dawson, Springs, Ky.	June 30
July 15	Main and Sub Laterals—Sidney, Mont.	June 9
July 15	Dredging—Baltimore, Md.	June 23

MISCELLANEOUS

July 1	Terminal Freighthouse — Rochester, N. Y. Adv. June 9 to 30.	June 9
July 5	Electrification of Railways—London, England	May 19
July 5	Heating and Ventilating Work—Bogota, N. J.	June 23
July 5	Retaining Wall—Boonton, N. J. Adv. June 23 and 30.	June 23
July 5	Steel Cells—Wende (Millgrove P. O.), N. Y.	June 30
July 7	Track Material—New York, N. Y.	June 23
July 7	Wharf—Alice Arm, B. C.	June 23
July 7	Wharf—Boswell, B. C.	June 23
July 7	Wharf — Cortez Island, B. C.	June 23
July 7	Wharf—Sandspit, B. C.	June 23
July 8	Covering Operators, House, etc.—Detroit, Mich.	June 16
July 12	Shafts—Jersey City, N. J. Adv. June 23 and 30.	June 23
July 15	Wharf—Le Pas, Manitoba	June 23
July 30	Pumps—London, Ont.	June 23
Aug. 14	Victoria, Australia	June 1

Where name of official is not given inquiries should be addressed to City Clerk, County Clerk or corresponding official.

Waterworks

PROPOSED WORK

Pa., Phila.—City plans to improve and build addition to Bensalem filters also build new water tower, mechanical filters, etc., cost $150,000; new pipe lines, $300,000; 72 in. steel pipe from Torresdale filters, $250,000. F. C. Dunlap, 216 City Hall, engr.

Minn., Forest Lake — City having plans prepared for complete waterworks system, including steel tower and tank, wells, pumps, machinery equipment and mains. About $70,000. T. Arends, recdr. Druar & Milinowski, 500 Globe Bldg., St. Paul, engrs.

Mo., Barnard—City having surveys made building waterworks system. About $20,000. E. T. Archer & Co., New England Bldg., Kansas City, engrs.

Que., Verdun—C. E. Gyhsens, city engr., opens bids about July 15, building additional filters and pipe connections at waterworks, cost $41,750, venturi meter, $3,650, chlorination system, $3,675.

BIDS DESIRED

N. J., Harvey Cedars (High Point P. O.)—Until July 9, by J. B. Kinsey, mayor, and Boro Council, building water supply system; advertised in this issue.

Ia., Durant—Until July 11, by city, building addition to waterworks system, involving 5,630 ft. 4 in. Class B. c.i. pipe, 14 hydrants, etc. About $15,000. P. Sanberg, clk.

S. D., Redfield—Until July 8 (change of date), by city, constructing concrete pumping building and rein.-con. reservoir, 1,000,000 gal. capacity. About $45,000. C. J. Mariner, aud. Cory & LeCocq, Aberdeen, engrs. Noted May 26.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

O., Akron—E. A. Ziesloft, dir. Pub. Serv., Delaware Bldg., received bids building pipe line together with apuprtenances between Cuyahoga River Crossing south of Kent and Tallmadge Center, Contr. 207, involving (a) furnishig c.i. pipe, (b) laying 48 in. c.i. pipe, (c) 48 in. lock bar steel pipe, (d) 50 in. riveted steel pipe, (e) 48 in. hammer-welded steel pipe, from United States Cast Iron Pipe & Fdry. Co., (a) $302,726, W. H. Hunt Sons, 5018 Metro St., (a) $302,726, (b) $112,490, (d) $269,110; Crumley & Jones, (a) $302,726, (b) $149,800, (a and b combined $412,000); States Contg. Co., (a) $302,726, (b) $145,085, (a and b combined, $407,812), (d) $319,898, (e) $287,440; P. F. Connolly, (a) $302,726, (b) $149,645, (c) $287,790, (d) $275,285, (e) pipe in 40 ft. lengths, $280,770, pipe in 30 ft. lengths, $285,270; East Jersey Pipe Co., (c) $268,750; T. E. McShaffrey Co., Forge St., (d) $290 420, (e) $278,510; Foundation Co., (e) $286,816. Unit prices on this project can be obtained by writing Engineering News-Record. Noted May 12.

★Minn., Starbuck — City let contract building water-works system, involving 50,000 gal. tank, 7,300 lin.ft. 4-8 in. c.i. pipe, to Republic Co., Albert Lea, $26,680. Noted June 2.

Sewers

PROPOSED WORK

Mass., Fall River—City plans to extend sewerage system. About $100,000. J. Brown, City Hall, engr.

N. H., Nashua—Dept. Pub. Wks. plans to build vitr. pipe sewers in various streets. About $50,000.

Pa., Aldan—City plans to build sewerage system. About $50,000. A. F. Danon, Jr., Darby, engr.

Pa., Phila.—City receives bids about July 23 building 12,000 ft. 6 ft. 6 in. concrete sewer in Packard St from 26th to 18th Sts., cost $250,000; 11,000 ft. Bigler St. from Vandalia to 7th Sts., $250,000; 2,000 ft. 57th St. from Malvern to Overbrook Aves., $60,000; 3,500 ft. Everett St. from McGee to Hellarand Sts., $115,000; 3,900 ft. Fletcher Ave. from Sedley to 29th Sts., $125,000; 5,600 ft. Vermango St. from Allen to Edgemont Sts., $75,000; 5,000 ft. Vermango St. from J to I Sts., $75,000; 10,000 ft Pratt St. from Oakland to Loretti Sts., $175,000; 3,000 ft. Maple Ave. from Cottage St. to Frankford Ave., $50,000; 4,000 ft. Bingham St. from Adams to Franklin Aves., branch to Phila. & Reading R.R., $75,000; 3,000 ft. Charles St. from Longshore to Gilmore and Tyson Sts., $50,000. F. Caven, City Hall, engr.

Col., Denver—See "Streets and Roads."

Que., Montreal — Administrative Comn. soon receives bids building brick sewers in Gouin Blvd. from St. Lawrence to St. Charles Sts. About $57,000. A. E. Doucet, city engr.

BIDS DESIRED

N. Y., Larchmont—Until July 5, by Bd. Village Trustees building sewers and house connections for sewers, gas and water; also storm water drains, curbs and gutters. E. C. Griffin, pres. L. E. Van Etten, 12 Lawton St., New Rochelle, village engr.; advertised in this issue.

N. Y., Long Island City—Until July 6, by M. E. Connolly, pres. Queens Boro, building sewer and appurtenances in Van Dam St., east side, from Hunterspoint Ave. to Gale St., Gale St. from Van Dam St. to Borden Ave., north side, and in Young St. from Gale St. to Hunterspoint Ave., 1st Ward.

N. Y., New York—Until July 8, by H. H. Curran, pres. Manhattan Boro, Municipal Bldg., for emergency repairs to outlet sewer at West 80th St. and Hudson River.

N. J., Paterson—Until July 12, by Passaic Valley Sewerage Comrs., 128 Market St., Newark, building northerly portion of Sect. 23 of Warren St. Branch Intercepting Sewer, here, involving 1,350 lin.ft. earth excav. and refilling in trench for 24 in. concrete sewer, 700 cu.yd. concrete masonry in trench, Portland cement mortar, 200 cu.yd. earth filling for grading, 5,000 lb. steel for reinforcement and 600 cu.yd. rock fill, in place, etc. J. H. Quigg, clk. J. R. Van Duyne, ch. engr.

Minn., Duluth—Until July 10, by J. A. Fairell, city comr. building Southville outlet sewers in 88th, 92nd, 93rd, Zunnerly, Commonwealth, Hulest, Clyde and Gogebic Ave., involving 8,196 ft. 6-24 in. c.i. pipe, 7,800 ft. earth trenching, etc. About $35,529. E. K. Coe, city engr.

N. D., Mandan—Until July 14, by city, building 2,200 ft. of 5 ft. trunk sewers, sewage lift station and 2,000 ft. lateral sewers. Black & Griffin, Mandan, engrs.

Utah, Logan City—Until July 11, by city, constructing 6½ mi. pipe sewers. A. H. Chambers, city engr.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

N. Y., New York—H. H. Curran, pres. Manhattan Boro., Municipal Bldg., received bids June 22, building sewers in West 187th St. and Ft. Washington Ave., etc., from Slattery Eng. & Contg. Co., 7 East 42nd St., $43,819; Estates Contg Co., $44,386; M. Delbalso, 1434 Bryant Ave., $45,518. Noted June 16.

Pa., Oakmont—Comrs. Haverford Twp. received bids June 24, building sewers, as follows: (1) Sect. 1, (2) Sect. 2, (3) Sect. 3, (4) Sect. 4, (5) Sect. 5, (6) Sect. 6, (7) Sect. 7, from F. T. Buckins, Jr., Kensington and Beals Sts., Phila., (1) $87,000, (2) $56,000, (4) $60,649, (5) $63,000, (7) $64,000; Amer. Paving & Material Co., 207 South 9th St., Phila., (1) $82,256, (4) $58,654; O'Neill Co., Weightman Bldg., Phila., (1) $71,490, (3) $52,490, (7) $61,000; J. McCool Co., Phila., (2) $51,340; Larson Underpining Co., Phila., (2) $45,903; A. A. Pastore, Phila., (3) $54,000, (6) $55,000; F. L. Ramsdale, Phila., (3) $61,200, (5) $62,800; P. Ellis, Darby, (4) $70,000; L. Mariana & Co., Phila., (5) $63,710, (6) $50,672; A. J. and D. M. Fraser, Phila., (6) $51,340, (7) $48,145.

★D. C., Wash.—Dist. Comrs., 509 Dist. Bldg., let contract constructing sewers in various streets, to W. F. Brenizer, 101 New York Ave., $34,800. Noted June 23.

O., Cleveland—City received bids laying 5,890 ft. 12-36 in. vitr. tile sewer in Leisy Allotment, including Mt. Overlook Ave., East 124th, 126th and 127th St., from Salem & George Bros., Bolivar Rd., $32,227; A. Marra, Illuminating Bldg., $34,175; Hadded-Mall Co., Schofield Bldg., $42,735.

O., Piqua—Until July 5, by A. W. Burton, dir. Pub. Serv. building 4,500 ft. 24-30 in. concrete and 1 420 ft. 15-18 in. vitr. sewer, etc., along bed of old M. and E. Canal from Bridge to Ash Sts. About $25,000. A. W. Schroeder, Piqua., engr.

Mich., Detroit—City received bids building (1) Lateral 3402, (2) 3441, (3) 3447, (4) 3449, (5) 3454, (6) 3456, (7) 3461, (8) 3469, (9) 3474, (10) 3476, (11) 3477, from Liberty Constr. Co., 917 Chamber of Commerce, (1) $17,900, (2) $21,200, (5) $9,000, (6) $22,000 (7) $4,130, (8) $2,100, (10) $8,200, (11) $6,20; Western Constr. Co., 1208 Ford Bldg., (1) $16,942, (2) $20,651, (3) $17,970, C. R. Lennane, 809 Union Trust Bldg., (1) $19,073; Langley & Barton, 400 Penobscot Bldg., (2) $19,500, (3) $17,700, (10) $9,500; Oakwood Constr. Co., 165 Fort Bldg., (3) $18,000, (11) $6,200; Gustin & Co., 5332 Allendale Ave., (4) $14,199, (9) $468; J. Zuccola, Penobscot Bldg., (4) $13,813; Detroit Drainage Constr. Co., Penobscot Bldg., (5) $8,700, (6) $22,000, (8) $2,360, (9) $445; Detroit Contg. Co., 827 Ford Bldg., (5) $8,752, (7) $4,985; V. Teeteart, 5230 Notre Dame St., (6) $25,293; McCordici Constr. Co., 1340 Penobscot Bld., (7) $5,250; A. Rossi, 1778 East Grand Blvd., (8) $1,999, (9) $399; J. S. Westover, Detroit, (10) $9,593; E. L. McIntyre, 3960 Grand River Ave., (1) $7,295. Noted June 9.

Wis., Janesville—City received bid June 15, building trunk sewer outlet in Eastern Ave., from Mierswa Constr. Co., Oshkosh, $95,372 Noted May 26.

★Ia., Dumont—City let contract building sewerage system and pumping station, to Dearborn Constr. Co., Waterloo, $50,000; disposal plant to A. Phelps, Knoxville, $8,650.

★Utah, Ogden—City let contract building 6 mi. main outfall sewer in Sewer Dist. 134, to Security Bridge Co., 502 North 32nd St., Billings, Mont., $351,011. Noted June 23.

Bridges

PROPOSED WORK

Mass., Lynn—State Highway Dept., 18 Tremont St., Boston, having plans prepared for 663 ft. on steel girder bridge, masonry piers and concrete flooring, on Boulevard over Saugus River, here. About $150,000. J. A. Rablin, state engr.

Bridges (Continued)

Pa., Lewistown—Boro. Council having plans prepared for 160 ft. concrete or steel bridge on South Main St. About $75,000. F. H. Shaw, 53 North Duke St., Lancaster, and J. B. Long, Norristown, engrs.

Pa., West Chester—Comrs. Chester Co. plan to build bridge over Brandywine Creek. Cost to exceed $50,000. H. K. Ellis, Court House, engr.

Alabama—State Highway Dept., Montgomery, plans to build 1,000 ft. structural steel bridge over Alabama River, with concrete trestle approaches. About $275,000. Montgomery and Autauga Counties to appropriate one fourth of cost.

O., Shadesville—Comrs. Franklin Co. (Columbus) rescinded contract let to E. Elford & Co., 307 East Gay St., Columbus, for building 779½ ft. concrete bridge, 20 ft. wide, over Scioto River, here. Work will probably be readvertised. Noted June 2.

Que., Montreal—Administrative Comn. opens bids about July 15 building 1,700 ft. concrete bridge 40 ft. wide, with parapets. About $150,000. J. E. Vanier, Beaver Hall Sq., engr.

BIDS DESIRED

N. H., Manchester—Until July 16, by D. F. Bronin, surv. Dept. Highways, Concord, rebuilding Amoskeag Bridge over Merrimac River and Boston & Maine R.R. Fay, Spofford & Thorndike, 15 Beacon St., Boston, engrs.; advertised in this issue.

Pa., Phila.—Until July 14, by city, removing old bridge on South St. over Schuylkill River, dredge channel, build foundation for 2 new bascule piers, also build foundation and complete two intermediate piers, etc. F. H. Caven, dir.; advertised in this issue.

Ala., Tuscumbia—See "Streets and Roads."

N. C., Winton—See "Streets and Roads."

S. C., Orangeburg—Until July 6, by Orangeburg Co. Highway Comn., building one 30 ft. and one 100 ft. rein-con. bridge. F. C. Wyse, Orangeburg, engr. Noted March 10.

Kan., Eureka—Until July 5, by Comrs. Greenwood Co. building bridges on Sect. 10, T 24, R 11, alternate 1, one 45 ft. and one 25 ft. span, state standard; alternate 2, one 65 ft. rainbow arch span, work involves 80 yd. Class A and 236.5 yd. Class C concrete, 17,349 lb. reinforcing steel, 220 yd. dry and 50 yd. wet excav. R. L. Martin, Eureka, engr.

Kan., Kingman—Until Sept. 7, by Clerk Kingman Co., building bridges, including two 14 ft. and four 20 ft. slab spans, three 30 ft. through girders and three 35 ft. T beams, involving 1,584 cu.yd. rein.-con., 44 tons steel, etc. About $35,000. C. C. Martin, Kingman, engr.

Kan., Topeka—Until July 15, by Shawnee Co., building 50 ft. rein.-con. bridge, ¼ mi. south of Elmont, involving 230 cu.yd. dry and 145 cu.yd. wet excav., 87 cu.yd. Class A and 239 cu.yd. Class C concrete, 15,997 lb. reinforcing steel. A. C. Lagerwill, Topeka, engr.

Minn., Duluth—Until July 22, by W. H. Barger, aud. St. Louis Co., building 9 steel and concrete bridges on north shore, 20 to 160 ft. spans. About $225,000. R. W. Acton, co. engr.

Mont., Thompson Falls—Until July 6, by State Highway Comn., Capitol, Helena, building three 200 ft. steel truss spans and timber approaches (a) approaches, involves 16,300 cu.yd. excav., 2,500 sq.yd. overhaul, 94 lin.ft 18 in. c.i. pipe culvts; (b) bridge, 446,000 lb. structural steel for trusses, 185,000 lb. structural steel for floor joints, 86,000 lb. steel tubular piers, 5,000 lin.ft. timber piling and 1,306 cu.yd. Class B concrete. About $80,000. J. N. Edy, engr. Noted March 11.

Que., Montreal—Until July 4, by Administrative Comn., building Part A, Asylum Bridge, concrete and associated work; Part B Monk and Woodlands Bridge, concrete piers and abutments; Part C, Church Bridge, rein.-con., wing walls. About $1,000,000. Montreal Water Bd., 50 Notre Dame St., engrs.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**W. Va., Pratt**—Comrs. Kanawha Co. let contract building substructure for 150 ft. concrete and steel span across Paint Creek, to Board & Duffield, 1012-14 Virginia St., Charleston, $18,440; superstructure, to Vincennes Bridge Co., Vincennes, Ind., $8,665. Noted June 9.

Alabama—State Highway Dept., Montgomery, received bids building (a) concrete bridges on Sect. A, road from Talladega to Calhoun Co. line, (b) bridge over Chocolloco Creek on road from Talladega to Calhoun Co line, from Stanley & Singer Constr. Co., La Fayette, (a) $26,801, (b) $27,917; Heer & Worthington, Birmingham, (a) $28,994, (b) $28,613; Smith Co., 30 3rd Ave. W., (a) $31,070, (b) $29,557. Noted June 2, under Streets and Roads.

Ky., Catlettsburg—State Highway Comn., Old Capitol Bldg., Frankfort, received bids June 15, building two 80 ft. steel clear spans over East Fork Creek, on Sta. 51 plus 50, for Boyd Co., from Vincennes Bridge Co., Vincennes, Ind., $24,098; Corn-Thomas Eng. Co., 1st Natl. Bank Bldg., Huntington, W. Va., $28,595; General Constr. Co. Inter Sou Bldg., Louisville, $31,517. Noted June 9.

Ia., Harlan—Shelby Co. received bids June 20 building 16-rein.-con. box culverts, 11 circular culverts, one 20 x 70 ft. and one 20 x 60 ft. steel pony truss bridges, one 20 x 40 ft. and one 20 x 24 ft. I beam spans, etc., on Primary Rd. 7, east of here, from F. E. Marsh & Co., Jefferson, $47,900; Jenson Constr. Co., Kimballton, $49,453; Wickham Bridge Pipe Co., Council Bluffs, $50,964. Noted April 28.

★**Miss., Poplarville**—Pearl River Co. let contract building 230 ft. steel drawbridge over Pearl River and 70 ft. fixed span steel bridge approach between Pearl River Co., Miss., and Washington Parish La., to Vincennes Bridge Co., Vincennes, Ind., $38,729.

Wis., Racine—Bd. Pub. Wks. received bids June 18, building rein.-con. bridge on West 6th St from McGucken Constr. Co., 425 East Water St., Milwaukee, $133,900; Stein Constr. Co., 204 Grand Ave., Milwaukee, $136,760; R. Reisinger & Co., 464 Oakland Ave., Milwaukee, $140,224. Noted June 9.

Streets and Roads

PROPOSED WORK

N. H., Nashua—City plans to pave various streets, permanent pavement. About $50,000. Address City Engineer, c/o Dept. Pub. Wks.

N. J., Cape May—Bd. Freeholders Cape May Co. plans to pave 2 mi. Cape May Point Blvd., concrete, cost $100,000; 1 mi. Seashore Rd., asphalt, $50,000; 1½ mi. Asbury Ave., Ocean City, concrete, $80,000, all 30 ft. wide. L. M. Rice, Wildwood, engr.

North Carolina—State Highway Comn., Raleigh, plans to grade, drain, gravel surface, etc., 5 mi. road from Hayesville to Georgia state line, State Aid Project 535, Clay Co. About $30,000. W. S. Fallis, state highway engr.

North Carolina—State Highway Dept., Raleigh, plans to grade, drain, clear, grub, bridge and gravel surface 10 mi. road from Murphy to Belview, State Aid Project 534, Cherokee Co. About $60,000. W. S. Fallis, state highway engr.

N. C., Gastonia—Gaston Co. election July 18, to vote on $800,000 bonds to build roads. R. K. Davenport, chn.

N. C., Winton—Hertford Co. plans election soon to vote on $500,000 bonds to build roads and bridge over Chowan River. E. K. Eure, comr.

Fla., Miami—City having plans prepared paving 2½ m. Miami Ave., asphalt with concrete curb and gutters. About $54,000. C. W. Murray, 1010 10th St., engr.

Alabama—State Highway Comn., Montgomery, had plans prepared grading, draining and surfacing 4.8 mi. road from Lanett to Fairfax, Chambers Co., sand clay or gravel. About $90,000. W. S. Keller, Bell Bldg., Montgomery, state highway engr.

Ala., Tuscumbia—Colbert Co. voted $250,000 bonds June 14, making possible $1,000,000 worth of road and bridge work in county. This work to be done on state trunk roads and in charge of State Highway Dept. W. S. Keller, Bell Bldg., Montgomery, engr.

O., Dayton—City plans to pave 1,800 ft. Louie St. from Norwood to Washington Sts., involving 6,000 sq.yd. vitr. brick on concrete base, and 3,000 lin.ft each cement curbing and guttering. About $31,000. G. Baker, city engr.

Michigan—State Highway Dept., Lansing, plans to grade and drain 12 mi. Federal Aid Project 49, Cass Co.; grade, drain and surface 2 mi. State Trunk Line Rd. 34-1, Sects. A and C, Lenawee Co., concrete or bituminous concrete. F. F. Rodgers, state highway comr.

Michigan—State Highway Dept., Lansing, plans to grade, drain and surface 1¼ mi. State Trunk Line Rd. 13-8, Sect. A, Wexford Co., ¾ mi. to be surfaced with concrete and ½ mi. with gravel. F. F. Rodgers, state highway comr.

Michigan—State Highway Dept., Lansing, plans to grade, drain and surface 5 mi. State Trunk Line Rd. 18-1, Sect. B, Cheboygan Co.; 1 mi. State Trunk Line Rd. 26-9, Houghton Co., bituminous macadam or bituminous concrete on macadam base; 8 mi. State Trunk Line Rd. 53-4 Sect. B, Lapeer Co. F. F. Rodgers, state highway comr.

Michigan—State Highway Dept., Lansing, plans to grade, drain and surface 1¾ mi. State Trunk Line Rd. 87-1, Oakland Co., 1¼ mi. State Trunk Line Rd. 14-34, Ingham Co., 5 mi. Federal Aid Project 54, Sect. B, Genesee Co., concrete or bituminous concrete; grade and drain 12 mi. Federal Aid Project 49, Sects. A and B, Cass Co. F. F. Rodgers, state highway comr.

Michigan—State Highway Dept., Lansing, plans to grade, drain and surface 4½ mi. State Trunk Line Rd. 62-2, Sects. B and C, Cass Co. F. F. Rodgers, Lansing, state highway comr.

Mich., Detroit—City plans to pave with sheet asphalt on 8 in. concrete base with berea, medina or amherst curbstone, Canfield Ave. from Pennsylvania to St. Clair Aves. cost $30,430, Collingwood Ave. from Belleterre to Livernois Aves., $10,280, Lawrence Ave. from 12th St. to City Park site, $24,690, Piquette Ave. from St. Aubin Ave. to Chene St., $22,580, Highland Ave. from Pere Marquette R.R. to LaSalle Ave., $5,150, Hillger Ave. from point 516 ft. north of Goethe to Mack Aves., $24,960, Raymond Ave. from Harper to Peter Hunt Aves., $7,425, Canton Ave. from East Grand Blvd. to Harper Ave., $38,150, Woodside Ave. from Grand River to Collingwood Aves., $24,350, Emmons Ave. from McClellan to Pennsylvania Aves., $13,600, May Ave. from Harper to Peter Hunt Aves., $7,820, Ford Ave. from 12th St. to Wabash Ave. $16,010, Anderdon Ave. from Charlevoix Ave. to point 120 ft. north of Mack Ave., $44,880, Arlington Ave. from Carter to Davison Aves., $53,170, Farnsworth Ave. from Rusell to Riopelle Sts., $9,080, Ladue Ave. from Baldwin to Van Dyke Aves., $9,380, Wilson Ave. from Longfellow Ave. to Chicago Blvd., $6,170, Hamilton Ave. from Shoemaker to Harper Aves., $37,880, Fisher Ave. from Harper to Marquis Aves., $41,780, Montclair Ave. from Shoemaker to Harper Aves., $36,530, Tuxedo Ave. from Pere Marquette R.R. to Linwood Ave., $24,500. C. W. Hubbell, city engr.

Mich., Detroit—City plans to pave Stair Ave. from Ferndale to Dix Aves., cost $26,690, American Ave. from Grand River to Burlingame Aves., $16,700, Medbury Ave. from Helen to Frontenac Aves., $10,500, all sheet asphalt on 8 in. concrete base, berea, medina or amhurst curbstone; alley between Holcomb, Belvidere, Sylvester and Canfield Aves., $5,990, alley between Concord, Canton, Sylvester and Stuart Aves., $2,750, one course concrete. C. W. Hubbell, city engr.

Ill., Alton—City plans to surface 8 blocks, brick on concrete base. About $25,000. J. L. Crockett, city engr.

Ill., Bushnell—City plans to pave 5 block Davis St., 40 ft. wide, asphalt on 5 in. concrete base. About $30,000. W. Holmes, Macomb, engr.

Ill., Carlinville—Macoupin Co. having plans prepared for paving, grading and draining ¾ mi. Marine Rd., 15 ft. wide, concrete, in Pen Oak Twp. About $40,000. W. E. Hawden, supt. Private Plans.

Ill., Geneseo—City plans to pave Main St., 36 ft. wide, vitr. brick on concrete base. About $25,000. F. Morrow, clk. A. Anderson, Moline, engr.

Ill., Joliet—City having plans prepared paving Glenwood Ave., asphalt on concrete base, concrete curbs and gutters. About $25,000. A. S. Calkins, Natl. Bank, engr.

Ill., Lockport—City plans to pave 13th and Jefferson Sts., involving 12,000 sq.yd. asphaltic concrete. Kelker, Gates & DeLeuw, Conway Bldg., Chicago, engrs.

Wis., Beaver Dam—City receives bids July 15 paving 2 mi. Main St., 20 ft. wide,

Streets and Roads (Continued)

2 course concrete, concrete curbs and gutters. About $75,000. Parsons & Orbert, 216 West Water St., Milwaukee, engrs. Noted May 19.

Minnesota—State Highway Dept. St. Paul, soon opens bids grading and graveling 22 mi. Trunk Highway 6, between Lake Benton and Trotsky, Pipestone Co., also paving 1 mi. through Pipestone, cost $180,000; grading and graveling 30 mi. Trunk Highway 9, between Worthington and Jackson, Nobles and Jackson Counties, $180,000; grading 22 mi. between Blue Earth and Banks, Fairbault Co., $66,000; grading and graveling 12 mi. Trunk Highway 11, between Warroad and Roosevelt, Beltrami Co., $120,000, 8 mi. Trunk Highway 58, between Farmington and Hampton, Dakota Co., $40,000, 35 mi. Trunk Highway 65, between Bagley and Terrebone, Clearwater Co., $195,000.

Minn., Aitkin—Aitkin Co. having plans prepared surfacing 10 mi. Trunk Highway 2, through Tamarack, 24 ft. wide, gravel. About $25,000. F. J. O'Hara, Aitkin, engr.

Minn., St. Cloud—City rejected bids opened May 24 paving 27,848 sq.yd. in Impvt. Dist. 428, concrete and bitulithic. M. B. Lang, city engr. Noted June 9.

Kan., Ft. Scott—Bourbon Co. plans to pave 6.5 mi. Ft. Scott-Pittsburg Rd., 16 ft. wide, bituminous filled macadam. About $180,000. B. Boyle, Ft. Scott, engr.

Kan., Wichita—City plans to pave, curb and gutter 2 mi. Mildred St. from Rutan to Clifton Sts., Gilman St. from Franklin to Murdock Sts., St. Clair St. from Douglas to Anderson Sts., New York St. from Douglas to 1st Sts., Topeka Ave. from Harry to Psie Sts., Arkansas St. from 21st to 25th Sts., Coolidge St. from Briggs to Harrison Sts. 30 ft. wide, concrete and asphaltic concrete. P. L. Brockway, Wichita, engr.

S. D., Sioux Falls—City plans to pave Main Ave. from McClellan to Russell Sts., involving 7,155 sq.yd. About $25,000. W. C. Leyse, clk. S. B. Howe, 220 South Grange Ave., engr.

Missouri—State Highway Dept., Jefferson City, plans to build 2.44 mi. state road from Bloomsdale, northwest, State Aid Project S 20.31, St. Genevieve Co., involving 9,696 cu.yd. earth and 6,644 sq.yd. rock excav., 1,658 cu.yd. borrow, 79.2 cu.yd. Class B and 55.1 cu.yd. Class C concrete masonry, etc. About $31,867.

Missouri—State Highway Dept., Jefferson City, plans to build 4.21 mi. state road from Lexington east and west, State Aid Project S 20.52, Lafayette Co., involving 37,252 cu.yd. earth excav., 500 cu.yd. borrow, 22.8 cu.yd. Class B and 6.4 cu.yd. Class C concrete masonry, etc., cost $26,686; 3.3 mi. state road from Taylor north and south, State Aid Project S 20.39, Marion Co., 10,095 cu.yd. earth excav., 20,708 cu.yd. borrow, 33 cu.yd. Class B and 13.4 cu.yd. Class C concrete masonry, etc., $25,000.

Missouri—State Highway Dept., Jefferson City, plans to build 8.5 mi. Cairo-Poplar Bluff State Rd., Federal Aid Project 179, Stoddard Co., involving 9,000 cu.yd. earth excav. and 84,483 sq.yd. gravel. About $88,200.

Missouri—State Highway Dept., Jefferson City, plans to build 8 mi. Cairo-Poplar Bluff State Rd., Federal Aid Project 178, Stoddard Co., involving 8,250 cu.yd. earth excav. and 58,080 sq.yd. gravel pavement, etc. About $75,700.

Missouri—State Highway Dept., Jefferson City, plans to build 2.97 mi. state road from Morgan Co. line, southward, State Aid Project S20.41, Camden Co., involving 17,169 cu.yd. earth and 2,000 cu.yd. rock excav., etc. About $27,352.

Mo., Alton—Oregon Co. having plans prepared paving 8 mi. road from Ripley Co. line to Alton thence west to Thomasville and north to Shannon Co., bituminous macadam on concrete base. About $125,000. Eaton-Axon & Russell, Springfield, engrs.

Mo., St. Joseph—City plans to surface 2d St. from Florence Rd. to Elk St. and from Antelope to Fawn Sts., brick on concrete base. About $25,000. Engineer not selected.

Tex., Brenham—Comrs. Washington Co. soon receive bids paving 33 mi. Austin-Houston Highway, Federal Aid Project 236, gravel-bituminous. G. A. Bracher, co. engr.

Tex., Clarksville—City having plans prepared paving various streets, vitr. brick on concrete base. Bonds for $50,000 voted for project. P. Y. Creager, City Hall, engr.

Tex., Crockett—Houston Co. having plans prepared grading and surfacing with sand clay and native gravel 16.5 mi. Kings Highway 21, 24 ft. wide, involving 150,000 cu.yd. borrow, 90,000 cu.yd. embankment, etc. About $119,570. R. E. Keller, Crockett, engr.

Tex., Littlefield—Lamb Co. (Olton), Rd. Dists. 1 and 2, voted $50,000 bond issue to build Highway 28, here. C. L. Hasie Eng. Co., Littlefield, engrs.

Tex., McKinney—Collins Co. having plans prepared surfacing 3.3 mi., 24 ft. wide, in Blue Ridge and Snow Hill Dists., gravel on concrete base. Bonds for $50,000 voted for project. F. W. Carthon, McKinney, engr.

Tex., Mt. Pleasant—Henderson Co. had plans prepared building 11.2 mi. Highway 19. About $119,000. H. S. Wilder, co. engr.

Tex., Seguin—Guadalupe Co. plans election latter part of June to vote on additional $65,000 bonds to complete 19 mi. State Highway 3, 16 ft. wide, between here and Bexar Co. line, Rd. Dist. 5. Total cost $165,000. H. Skinner, South West Life Bldg., Dallas, engr.

Okla., Eufaula—City plans to pave 26 blocks, Dist. 3, macadam. Hughes Eng. Co., 304 Bank of Commerce, Tulsa, engrs.

Okla., Sand Springs—City Comn. receives bids about July 25, paving in Dist. 4, involving 12,613 sq.yd. concrete, 8,106 lin.ft. curbing, 6,950 cu.yd. earth excav. and 6,220 cu.yd. embankment. About $88,410. Holway Eng. Co., 230 Lynch Bldg., Tulsa, engrs.

Col., Denver—City plans to grade, curb, pave with asphalt and build sewers in 7 blocks Bway. Paving Dist. 5. About $111,758. J. B Hunter, City Hall, engr.

Utah—State Highway Dept., Salt Lake City, plans to grade and gravel surface 9.5 mi. road from Holden to Fillmore, 24 ft. wide, Beaver and Millard Counties. About $105,000. I. R. Browning, state highway engr.

N. S., Halifax—City authorized issuance of $60,000 bonds to build permanent sidewalks.

Ont., Watford—Lambton Co. plans to build concrete highway. About $50,000. Prices wanted on all materials. W. Sproule, Oil Springs, engr.

BIDS DESIRED

Maine—Until July 14, by State Highway Comn., Augusta, grading, draining and surfacing 3.59 mi. state highway in Bangor and Veazie, cement concrete, and 3.1 mi. in Turner and Livermore, gravel. P. D. Sargent, ch. engr.

New York—Until July 13, by H. S. Sisson, comr. State Highway Dept., 55 Lancaster St., Capitol, Albany, improving highways in Chautauqua, Cortland, Delaware, Greene, Ontario, Rensselaer, St. Lawrence, Seneca, Steuben and Yates Counties; repairing highways in Erie, Genesee, Jefferson and Westchester Counties. J. C. Finch, secy.; advertised in this issue.

N. Y., Buffalo—Until July 8, by Commissioner Pub. Wks., Municipal Bldg., repaving 139 ft. Scott St. from Michigan Ave. to West Market St.; paving 478 ft. Melvin Pl., 1 969 ft. Green St. from Moreland to King Sts., 1,661 ft. Humason Ave. from Genesee to Hemingway Sts., 1,391 ft. Grimes St. from Young to Peck Sts., 1,967 ft. Zelmer St. from Genesee to Doat Sts., vitr. brick, wood block or asphalt, on 6 in. concrete base. G. H. Norton, Municipal Bldg., engr.

N. Y., Ilion—Until July 8, by Bd. Trustees and Bd. Street Comrs., Union St., constructing about 6,900 sq.yd. rein.-con. pavement including necessary curbing and catch basins, etc. R. H. Whiter, pres. S. Squire, 21 Remington Ave., village engr.; advertised in this issue.

N. Y., Lambertville—Until July 9, by Bd. City Comrs., Bridge St., paving portions of Main, York and Bridge Sts., sheet asphalt on rebuilt macadam base. I. M. Smith, clk.; advertised in this issue.

N. Y., Long Island City—Until July 6, by M. E. Connolly, pres. Queens Boro., regulating and grading sidewalk and gutter space, setting curb and laying sidewalks on (1) westerly side of Bell Ave., 3d Ward, from Crocheron to Jackson Aves. (excluding right of way of Long Island R.R.) and on easterly side from Crocheron to Wainscott Aves., (b) regulating, grading sidewalk space and laying sidewalks on easterly side from Wainscott to Jackson Aves.; regulating and paving (2) Decatur St. from Myrtle to Forest Aves., sheet asphalt on concrete foundation; regulating, grading, curbing, laying sidewalks and paving (3) 86th St. from Park Lane south to Jamaica Ave., 4th Ward, asphalt block on concrete foundation, also building 6 receiving basins in northeast and northwest corners of Jamaica Ave., 86th and 87th Rds.; regulating, recurbing, reflagging and paving (4) Ridge St. from Sherman St. to Ely Ave., 1st Ward, sheet asphalt, on concrete foundation; regulating, curbing, grading and laying sidewalks on (5) Ralph St. from Prospect to Grandview Aves., 2d Ward.

N. Y., Middletown—Until July 8, by Bd. Estimate & Apportionment, at office of City Clerk, City Hall, paving Monhagen Ave., Harding, Fulton Sterling and West Main Sts. J. A. Korschen, comr. Pub. Wks.; advertised in this issue.

N. Y., Washington—Until July 13, by Bd. Freeholders Warren Co. (Belvidere) paving State Highway Route 12, Sect. 5, from Marlatts Corner to Ft. Golden, Washington Twp., here, Portland cement rein.-con. M. S. Faust, clk. H. W. Vetter, Court House, Belvidere, co. engr.; advertised in this issue.

N. J., Beverly — Until July 8, by Bd. Freeholders Burlington Co. (Mt. Holly) paving 7,456 sq.yd. Warren St., here, concrete. J. Logan, Mt. Holly, engr.

W. Va., Harrisville—Until July 11, by Clerk or Comrs. Ritchie Co., draining and grading, .64 mi. Cairo-Nutter Farm Rd., known as Shields Hill, Grant Dist., involving 16,000 cu.yd. unclassified excav., 240 cu.yd. Class A concrete, 6,000 lb. reinforcing steel, ettc. H. J. Gathwol, co. engr.

Fla., Palatka—Until July 5, by Comrs. Putnam Co. constructing road and 2 bridges, involving 17 acres clearing, 21,850 cu.yd. grading, 6,120 cu.yd. gravel and 10,760 cu.yd. sand-clay surfacing, etc. R. J. Hancock, clk.

Ky., Beattyville—Until July 11, by City Clerk, paving 10,012 sq.yd. Locust, East Main, West Main, Grand Center, Vine and Elm Sts., macadam, 4 in. thick on side, 6 in. in center; 7,750 sq.yd. Main, Lumber, Grand, Center and Walnut Sts., 6 in. concrete.

Mich., Adrian—Until July 14, by State Highway Dept. at office Bd. Rd. Comrs. Lenawee Co., grading, draining and surfacing 0.782 mi. State Trunk Line Rd. 34-1, Sect. A, involving 2,696 cu.yd. excav., 9,060 sq.yd. concrete or bituminous concrete.

Mich., Adrian—Until July 19, by State Highway Dept. at office Bd. Rd. Comrs. Lenawee Co., grading, draining and surfacing 1.149 mi. State Trunk Line Rd. 34-1, Sect. C, involving 3,085 cu.yd. excav., 13,050 sq.yd. concrete or bituminous concrete. F. F. Rodgers, Lansing, state highway comr.

Mich., Charlotte—Until July 14, by State Highway Dept. at office Bd. Rd. Comrs. Eaton Co., grading, draining and surfacing 7.185 mi. Federal Aid Project 58, Sect. D, involving 54,800 cu.yd. excav., 67,442 sq.yd. gravel.

Mich., Flint—Until July 15, by State Highway Dept. at office Bd. Rd. Comrs. Genesee Co., grading, draining and surfacing 4.969 mi. Federal Aid Project 54, Sect. B, involving 18,982 cu.yd. excav., 52,353 sq.yd. concrete or bituminous concrete. F. F. Rodgers, Lansing, state highway comr.

Mich., Holly—Until July 12, by village clk., grading, draining and surfacing Maple and Saginaw Sts., involving 2,610 cu.yd. excav., 7 915 lin.ft. concrete curb and gutter, 10,295 sq.yd. concrete or bituminous concrete.

Mich., Mason—Until July 13, by State Highway Dept. at office Bd. Rd. Comrs., Ingham Co., grading, draining and surfacing 1.347 mi. State Trunk Line Rd. 14-34, involving 8,095 cu.yd. excav., 15,785 sq.yd. concrete or bituminous concrete. F. F. Rodgers, Lansing, state highway comr.

Mich., Pontiac—Until July 12, by State Highway Dept. at office Bd. Rd. Comrs. Oakland Co., grading, draining and surfacing 1.747 mi. State Trunk Line Rd. 87-1, involving 4,179 cu.yd. excav., 20,484 sq.yd. concrete or bituminous concrete. F. F. Rodgers, Lansing, state highway comr.

Mich., Port Huron—Until July 14, by State Highway Dept. at dist. office, Port Huron, fine grading and surfacing 5.72 mi. State Trunk Line Rd. 27-13, involving 60,279 sq.yd. concrete or bituminous concrete. F. F. Rodgers, Lansing, state highway comr.

Mich., Port Huron—Until July 14, by State Highway Dept. at office Bd. Rd. Comrs. St. Clair Co., grading, draining and surfacing 1.886 mi. State Trunk Line Rd. 27-16, involving 22,000 sq.yd. concrete or bituminous concrete.

Streets and Roads (Continued)

Mich., St. Johns—Until July 12, by State Highway Dept. at office Bd. Rd. Comrs. Clinton Co., grading and draining 15.986 mi. State Trunk Line Rd. 14-33, Sect. B, C and D involving 91,354 cu.yd. excav. F. F. Rodgers, Lansing, state highway comr.

Mich., Sturgis—Until July 14, by R. D. Ballew, city mgr., building 20,000 sq.yd. concrete pavement, combined curb and gutter. About $70,000.

Ill., Highland—Until Aug. 1, by city, paving 2.6 mi. road, 30 ft. wide macadam on concrete base. About $40,000. W. E. Howden, clk. Private plans.

Ill., Sesser—Until July 6, by city, constructing sidewalks. About $39,697. C. B. Mautz, Benton, engr.

Wis., Shawano—Until July 5, by Common Council, paving various streets. Alternate bids will be received on 6,232 sq.yd. rein.-con. pavement, like amount of pavement with 5 in. concrete base, vitr. block wearing surface with grout filler, asphalt filler and sheet asphalt wearing surface.

Wis., West Allis—Until July 9, by Bd. Pub. Wks., paving 53d, 48th, 61st, 66th, 67th and National Aves., involving 14,491 cu.yd. grading, 32,156 sq.yd. asphalt, concrete or vitrolithic, 35,955 sq.yd. rein.-con. integral curb, etc. A. Schneider, city engr.

Ia., Boone—Until July 20 (change of date) by O. Hile, city clk., paving 8th, Allen, 7th, West 3rd and Green Sts., involving 42,400 sq.yd. About $110,000. C. L. Ehrhart, city engr. Noted June 9.

Minn., St. Paul—Until July 5, by city, paving Hastings Ave. from Earl St. to Point Douglas Rd. and Point Douglas Rd. from Hastings Ave. to south city limits, involving 18,480 bbl. portland cement, 350 cu.yd. gravel or crushed stone, 8,194 cu.yd. concrete sand, 108,204 lb. asphalt filler, etc., cost $200,000; Jefferson Ave. from Snelling to Fredericks Aves., 1,330 bbl. portland cement, 935 cu.yd. crushed rock, 101 tons asphalt, etc., $8,000; Maryland Ave. from Payne to Duluth Aves., 15,576 sq.yd vitr. clay paving blocks, 3,180 bbl. portland cement, 1,300 cu.yd. concrete sand, 2,165 cu.yd. crushed rock or gravel, 186,912 lb. asphalt filler, etc., $40,000. Bids received on (1) furnishing material and labor, (2) furnishing material only. O. Claussen, city engr. Noted May 5.

Tex., Brenham—Until July 7, by J. H. Chappell, judge Washington Co., grading, graveling and draining, 16.81 mi. State Highway 20, from here to Fayette Co. line, involving 16.4 acres clearing and grubbing, 51,844 cu.yd. borrow and 12,522 cu.yd. structural excav., 49,900 cu.yd. roadway excav., 2,047 cu.yd. 1:2:4 and 111.2 cu.yd. 1:2½:5 concrete, 49,900 cu.yd. gravel surfacing, 161,078 lb. reinforcing steel, 157,808 sq.yd. 1½ in. bituminous macadam, about $450,000; 14.14 mi. Austin-Houston Highway from here to Waller Co. line, 1,282.4 cu.yd. Class A and 78.4 cu.yd. Class B concrete, 43,862 cu.yd. gravel surfacing, 132,739 sq.yd. 1½ in. bituminous macadam, 103,212 lb. reinforcing steel, $360,000. G. A. Bracher, Brenham, engr

Tex., Burnet—Until July 6, by J. R. Smith, judge Burnett Co., grading and surfacing 10 mi. State Highway 36-B, involving 45,374 cu.yd. borrow, 17,314 cu.yd. earth, 1,374 cu.yd. loose and 4,338 cu.yd. solid rock excav., 569.58 sq.yd. Class A and 189.06 sq.yd. Class B concrete, 48,512 lb. reinforcing steel, 6,162 cu.yd. gravel surfacing, etc. About $55,000. Hess & Skinner, South Western Life Bldg., Dallas, engrs. Noted May 16.

Tex., Canyon City—Until July 11, by J. D. Gamble, mayor, improving various streets. C. L. Hasie, Littlefield, engr.; advertised in this issue.

Col., Longmont—Until July 5, by G. H. Stenex, city clk., improving various streets; advertised in this issue.

Col., Trinidad—Until July 11, by city, paving various streets, involving 40,000 sq. yd. bitulithic pavement on concrete base, and 33,000 lin.ft. concrete curb and gutter. D. Corey & Fisk, Trinidad, supervy. engrs.

California—Until July 11, by State Highway Comn., 515 Forum Bldg., Sacramento, grading 10.6 mi. highway between Weaverville and Tom Long Gulch, Trinity Co. A. B. Fletcher, highway engr.

Cal., Los Angeles—Until July 11, by Bd. Supervs. Los Angeles Co., Hall of Records, paving 3½ mi. Anaheim-Spadra Rd., Brea Canyon, involving 38,472 sq.yd. 6 in. concrete, 30,126 cu.yd. excav., 10,120 bbl. cement, 30,460 lb. reinforcing steel, etc.

Cal., Modesto—Until July 6, by Bd. Supervs. Stanislaus Co. paving 4½ mi. highway east from here on Waterford Rd., topeka or bitulithic concrete.

Cal., San Luis Obispo—Until July 6, by Bd. Supervs. San Luis Obispo Co., paving 3¾ mi. Arroyo Grand-Oceano Rd., oil macadam or concrete. W. B. Burch, co. engr.

Nova Scotia—Until July 4, by Provincial Highway Bd., Halifax, building 8.92 mi. Port Hawkesbury-Sydney Rd., gravel macadam. About $34,500. W. A. Hendry, Halifax, engr.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**Massachusetts**—State Highway Dept., 413 State House, Boston, let contract paving 4,486 ft. state highway, in Watertown, bituminous macadam, to T. J. McCue, Watertown, $30,498; 3.2 mi. in Marblehead and Swampscott, bituminous macadam, to M. McDonough, Salem, $54,908. Noted June 9.

★**Mass., Great Barrington**—Town let contract paving 2,000 lin.ft. South Main St., 18-20 ft. wide, concrete, to Meneguale & D'Angelo, Goodrich St., Stockbridge, $27,487. Noted June 16.

★**Mass., Spring Valley**—City let contract paving various streets, involving 30,134 sq. yd. asphaltic concrete, 11,640 lin.ft. straight curbs, 1,301 lin.ft. circular curb, 1,384 lin. ft. header curb, 20,090 cu.yd. excav., 1,000 sq.yd. sidewalks, to C. W. Schruth, 704 First Natl.-Soo Line Bldg., Minneapolis. About $150,000.

★**Mass., Springfield**—City will pave ½ mi. Central St., granite block on cement concrete base. About $28,000. Work will be done by day labor. R. P. Marsh, supt. Street Dept.

★**Connecticut**—State Highway Comn., 240 Farmington Ave., Hartford, let contracts paving 4,050 ft. Hanover Rd. in Sprague, 7 in. native stone macadam, to L. Loughi & Bros., 43 Center St., Torrington, $15,826; 5,680 ft. Newington-Berlin Rd., Newington, 2 in. bituminous macadam, to Lane Constr. Co., 39 Colony St., Meriden, $12,504, 3,900 ft. East Longmeadow Rd., Somers, 3 in. bituminous macadam on 5 in. stone base, to J. DeMichael & Bro., 58 High St., Torrington, $16,840; 12,510 ft. Higganum Rd., in Killingworth, 5 in. native stone macadam, to A. Brazos & Son, 66 Oak St., Middletown, $28,608. Noted June 16.

N. Y., Brooklyn—E. Riegelmann, boro. pres., Boro Hall, received bids June 22, regulating, curbing and laying sidewalks on (1) Bay 37th St. from 86th St. to Henson Ave., (2) 21st Ave. from 66th to 67th Sts.; regulating and paving (3) East 19th St. from Ave. N. to Ave. O., (4) Frost St. from Kingsland to Debevoise Aves., (5) Stillwell Ave. from Neptune to Surf Aves., (6) West 19th St., from Mermaid to Surf Aves., etc., (7) 63rd St. from 18th to 19th Aves.; permanent asphalt on 6 in. concrete foundation; regulating, curbing, grading and laying sidewalks on (8) East 35th St. from Church to Snyder Aves., from

Grimm Constr. Co., 170 McKinley Ave., (1) $3,287, (2) $1,007, (8) $3,729.

Simonelli & Son, Inc., 28 Conselyea St., (1) $3,445, (2) $969.

P. Carbone, (1) $3,661.

Cranford Co., 52 9th St., (3) $16,029, (4) $5,708, (5) $10,233, (6) $5,937, (7) $9,528.

Borough Asphalt Paving Co., 1301 Metropolitan Ave., (3) $16,414, (4) $5,724, (5) $10,532, (6) $6,069, (7) $9,709.

F. Pursicano, (8) $42,209.

J. Marzio, (8) $4,419. Noted June 16.

★**N. Y., New York**—H. H. Curran, pres. Manhattan Boro., let contract regulating and repaving Stanton St., etc., to P. J. Kearns Contg. Co., 2306 Creston Ave., $7,392; roadway of old slip, etc., to J. Meehan & Son, 74 Cortlandt St., $38,701. Noted June 23.

★**N. J., Belvidere**—Bd. Freeholder Warren Co. let contract paving 5 mi. Sect. 3, Morris Turnpike from Phillipsburg to New Village, to Freeland Constr. Co., Allentown, Pa., 92.8% of engineers estimate ($26,947). Noted May 26.

★**N. J., Bridgeton**—City let contract paving various streets, asphalt, to E. R. Mixner, Goshen. About $117,000. Noted June 23.

Pennsylvania—State Highway Dept., Harrisburg, received bids June 21, building Application 1303, 10,500 ft. one course rein.-con. or bituminous surface course, Athens Twp., Bradford Co., from F. G. Fowler Constr. Co., Mt. Kisco; N. Y., $106,615; R. D. Richardson Constr. Co., 828 Connell Bldg., Scranton, $115,030.

Route 156, 44,656 ft. one course rein.-con. and Hillside vitr. brick, Bedminster, Tinicum and Noxamixon Twps., Bucks Co., from W. C. Evans, Ambler, $466,610; B. Foster, trading as B. Foster Co., 20th and Venango Sts., Phila., $505,110; Cranford Paving Co., 2620 East St. N. W., Wash., D. C., $540,802.

Route 147, 21,285 ft. one course rein.-con., West Vincent, East Nantmeal and South Coventry Twps., Chester Co., from Ambler-Davis Co., Harrison Bldg., Phila., $310,370; C. H. Dunleavy, 9 Pennegar Bldg., Coatesville, $318,747; Sutton & Corson Co., 9th and Simpson Aves., Ocean City, N. J., $344,944.

Route 105, 3,928 ft. one course rein.-con., Noyes Twp., Renovo Boro., Clinton Co., from W. J. and J. T. Gephart, Linden, $66,962; Miller Constr. Co., Punxsutawney $70,587; Johnson & Kearns, 5 West Long Ave., Dubois, $72,254.

Route 82, 24,787 ft. one course rein.-con. or bituminous surface course, West Fallowfield Twp., Crawford Co., from W. Derr, Box 92, Norristown, $247,786, Spec. "A"; McCrady Bros. Co., 308 6th St., Braddock, $252,567; Standard Paving & Contg. Co., 1361 West Lake Ave., Lakewod, O., $252,888, Spec. "A."

Route 304, 13,278 ft. one course rein.-con. or bituminous surface course, Union Twp., Union City Boro., Erie Co., from Kennedy Bros., 1807 Ohio Ave., Youngstown, O., $136,549; Smethport Constr. Co., Smethport, $151,292.

Route 247, 14,486 ft. one course rein.-con. and hillside vitr. brick, Perry nd Jefferson Twps., Fayette Co., from R. Galiardi & Sons, 279 East Fairview Ave., Connellsville, $164,877; V. DiGiorno, Box 100, Fayette City, $183,659; Jones Constr. Co., Lisbon Rd., Salem, O., $186,655.

Route 55, 4,168 ft. one course rein.-con., Tyrone Twp., Blair Co., Spruce Creek and Morris Twps., Huntingson Co., from R. D. Richardson Constr. Co., 828 Connell Bldg., Scranton, $142,415; Burgess & Dorrier, Scottsville, Va., $142,483; Bennett & Randall, Lebanon, $150,196.

Route 136, 3,144 ft. one course rein.-con., Quarryville Boro., Lancaster Co., from M. Rosatto & Son Co., 1145 Sloan Ave., Scranton, $30,792; Sutton Contg. Co., Inc., 1207 Vine St., Phila., $31,534; J. M. Eshleman, Landisville, $31,628.

Route 97, 6,565 ft. one course rein.-con., Lafayette Twp., McKean Co., from F. D. Ross, 74 High St., Bradford, $75,167; M. Rosatto & Son, 1145 Sloan Ave., Scranton, $78,286; Smethport Constr. Co., Smethport, $82,753.

Route 18, 18,957 ft. one course rein.-con. or bituminous surface course, Point and Chillisquaque Twps., Northumberland Co., from R. W. Savidge & Co., Sunbury, $219,399, Spec. "A"; J. C. Schrade, 193 Beach and 108th Sts., Rockaway Beach, N. Y., $234,415; Comerford Constr. Co., 5th and Sansom Sts., Phila., $246,934.

Route 141, 10,688 ft. one course rein.-con. and bituminous surface course, Orwigsburg Boro., Schuylkill Co., from W. C. Evans, Ambler, $164,382; J. V. Cummins, 20 Gowen Ave., Phila., $167,817, Spec "D."

Routes 140 and 141, 2,749 ft. bituminous surface course and bituminous macadam, penetration method, Schuylkill Haven Boro., Schuylkill Co., from W. C. Evans, Ambler, $61,308, Spec. "A."

Route 196, 41,843 ft. one course rein.-con. or bituminous surface course, Richmond and Tioga Twps., Mansfield and Tioga Boros., Tioga Co., from M. Bennett & Sons, Indiana, $517,960; Comerford Constr. Co., 5th and Sansom Sts., Phila., $521,268; Greene-Hine Co., 345 East 33rd St., New York City, $524,912.

Route 216, 5,786 ft. one course rein.-con. or bituminous surface course, Dallastown Boro., York Co., from A. B. Kraft, 511 South Water St., York, $89,776, Spec. "A"; Continental Contg. Co., Knickerbocker Bldg., Baltimore, Md., $108,234.

Application 1164, 17,604 ft. one course rein.-con., Freehold Twp., Warren Co., from H. C. Howe, Sherman, N. Y., $15,275; E. M. Love & Son, Corry, $170,942; Burgess & Dorrier, Scottsville, Va., $177,890.

Pennsylvania — State Highway Dept., Harrisburg, received bids June 22, building Route 299, 34,433 ft. one course rein.-con., Canton and LeRoy Twps., Bradford Co., from H. W. Horst Co., Rock Island, Ill., $378,122; Atlanta Constr. Co., Atlanta, N. Y., $379,047; Comerford Constr. Co., 5th and Sansom Sts., Phila., $387,041.

Application 1246, 37,713 ft. one course rein.-con. or bituminous surface course, Ulster and Smithfield Twps., Bradford Co., from Comerford Constr. Co., 5th and San-

Streets and Roads (Continued)

som Sts., Phila., $423,794; Trinidad Asphalt Paving Co., Larksville, $431,950; F. G. Fowler Constr. Co., Mt. Kisco, N. Y., $441,294.

Route 281, 26,711 ft. one course rein.-con., Bensalem and Middletown Twps., South Langhorne Boro., Bucks Co., from McNichol Paving & Constr. Co., 1923 Cherry St., Phila., $346,555; J. J. Barrett, P. O. Box 704, Trenton, N. J., $367,619; Bates & Rogers Constr. Co., 37 West Van Buren St., Chicago, $381,625.

Route 78, 5,600 ft. one course rein.-con., Connoquenessing Boro., Butler Co., from C. E. Walter, Butler, $64,952; Allen & Kesner, Peoples Theatre Bldg., Tarentum, $71,920.

Route 65, 3,203 ft. one course rein.-con., Shippensville Boro., Clarion Co., from Red Bank Constr. Co., Inc., New Bethlehem, $60,736.

Route 105, 16,481 ft. one course rein.-con. Chapman Twp., Clinton Co., from A. L. Anderson & Bros., Inc., Altoona Trust Bldg., Altoona, $375,510; Miller Constr. Co., Punxsutawney, $415,806; Peconco Eng. & Contg. Co., 1170 Bway., New York City, $421,830.

Route 295, 12,515 ft. one course rein.-con. or bituminous surface course, Girard Twp., Erie Co., from C. H. Fry Constr. Co., Cherry and 19th St., Erie, $103,712; Penn Erie Constr. Co., Erie, $103,958; Standard Paving & Contg. Co., 1361 West Lake Ave., Lakewood, O., $115,094, Spec. "A."

Route 585, 11,294 ft. one course rein.-con., Quincy Twp., Franklin Co., from Continental Contg. Co., Knickerbocker Bldg., Baltimore, Md., $94,526; Souder Constr. Co.,349 Woolworth Bldg., Lancaster, $95,-649; J. J. and J. S. Detweiler & Son, New Enterprise, $97,978.

Route 54, 9,942 ft. one course rein.-con., Clymer Boro., Indiana Co., from F. Murphy, 2635 West Chestnut St., Altoona, $106,074; M. Bennett & Sons, Indiana, $111,163; Dowler & Anderson, Clearfield, $114,988.

Route 365, 13,666 ft. one course rein.-con., Abington and South Abington Twps., Lackawanna Co., from H. B. Sproul Constr. Co., Inc., 218 Adams Ave., Scranton, $138,-409; F. G. Fowler Constr. Co., Mt. Kisco, N. Y., $176,894; F. E. Spinner, 342 Madison Ave., New York City, $190,268.

Route 210, 5,341 ft. one course reni.-con. or bituminous surface course, Eldred Boro., McLean Co., from P. B. Colgan, Eldred, $56,635; Smethport Constr. Co., Smethport, $56,725; G. I. Thompson Co., Clearfield, $58,106.

Route 290, 825 ft. bituminous surface course, Shenandoah Boro., Schuylkill Co., from Gillespie & Franklin, 906 Crozer Bldg., Phila., $41,905

Route 51, 7,787 ft. one course rein.-con., Meyerdale Boro. and Summit Twp., Somerset Co., from D. Schoentag, Meyersdale, $119,171; W. C. Evans, Ambler, $131,555; D. E. Keller, 12 West Race St., Somerset, $134,037.

Applications 1185, 1186 and 1187, 23,957 ft. one course rein.-con. and Hillside vitr. brick, Oakland, Sugar Creek and Cornplanter Twps., Venango Co., from H. P. Streicher Co., Inc., 319 Terminal Bldg., Toledo, O., $250,763.

Route 279, 21,242 ft. one course rein.-con., Farmington and Sugar Grove Twps., Warren Co., from C. E. Walter & Co., Clarion, $211,626; J. C. Devine Co., Alliance, O., $214,039; Mason & Hanger Co., Inc., Gettysburg, $220,610.

Route 94, 36,392 ft. one course rein.-con. or bituminous surface course, Pine Grove Twp., Warren Co., from Standard Paving & Contg. Co., 1361 West Lake Ave., Lakewood, O., $340,616, Spec. "A"; Dale Eng. Co., Inc., Mann Bldg., Utica, N. Y., $354,-506; C. Campbell & Co., 96 Wall St., New York City, $357,321.

Route 250, 5,307 ft. one course rein.-con. or bituminous surface course, West Manchester Twp., North York Boro., York Co., from H. E. Baton, 1713 Sansom St., Phila., $107,211; Continental Contg. Co., Knickerbocker Bldg., Baltimore, Md., $109,343; W. S. Souder and J. A. Raeyling, trading as General Supply & Constr. Co., York, $109,-674, Spec. "A."

Alabama—State Highway Dept., Montgomery, received bids June 22, grading and surfacing 10.3 mi. road from Banks to Brundidge, Pike Co., from Rawlinson, Davis & Davis, Montgomery, $39,568; Smith Bros., Alexandria, La., $39,851; Pike Co. Court of Comrs., Troy, $40,452. Noted June 9.

Alabama—State Highway Dept., Montgomery, received bids grading, draining and surfacing (a) road from Talladega to Calhoun Co. line, Sect. A, Talladega Co., (b) road from Talladega to Calhoun Co. line, Sect. B, Talladega Co., (c) road and small bridges on Jackson Highway, Washington Co., (d) road from Calvert to Axis, Mobile Co., from Stanley & Singer Constr. Co., La Fayette, (a) $143,715, (b) $35,939, (c) $47,661, (d) $112,314; T. J. Wallace, Tuscaloosa, (a) $144,354; W. M. Thompson, Fayette, (a) $162,085; Gardiner & Crawford, Columbus, Ga., (b) $41,802; Smith Bros., Alexandria, La., (b) $44,630; Rawlinson, Davis & Davis, Montgomery, (c) $49,890, (d) $113,214; E. Pettus, Hope Hull, (c) $54,467; R. S. Taylor & Co., Clanton, (d) $118,600. Noted May 26 and June 2.

Kentucky—State Highway Comn., Old Capitol Bldg., Frankfort, received bids June 15, shaping, draining and surfacing 10.2 mi. Louisville-Paducah Rd. from Davies Co. line Sta. 6740 plus 18, to Baskett Sta. Cinder Rd. Sta. 7282 plus 00, State Project 8, Sect. A State Primary System, Federal Aid Project 51, Henderson Co., from Ellis & Smithers, Owensboro, $77,259, Hopkins County Constr. Co., Madisonville, $79,724, G. L. Mays & Co., 517 Oxford St., Knoxville, Tenn., $84,474; 2.5 mi. Middlesboro-Manring Rd., from west corporate limit of Middlesboro to Kentucky-Tennessee line, State Project 5, Sect. A, Sta. 0 plus 00, to Sta. 131 plus 32.9, Bell Co., rock asphalt, (1) limestone base, (2) slag base from R. S. Freeman, 805 North 3d Ave., Knoxville, Tenn., (1) $89,582, (2) $39,582, T. Vogelsburg, St. Mathews, (1) $94,232, (2) $94,232, J. Ellis, Owensboro, (1) $95,715, (2) $94,-432, bituminous macadam, penetration type, from Codell Byars Constr. Co., Winchester, $81,354, T. Vogelsberg, St. Mathews, $83,-288, R. S. Freeman, 805 North 3d Ave., Knoxville, Tenn., $81,774, waterbound macadam, surface treated, R. S. Freeman, 805 North 3d Ave., Knoxville, Tenn., $71,775, Codell Byars Constr. Co., $73,076, T. Vogelsberg, St. Mathews, $75,217, surface treated only, T. Vogelsberg, St. Mathews, $35,484, R. S. Freeman, 805 North 3d Ave., Knoxville, Tenn., $39,097; 4.4 mi. Hartsford-Owensboro Rd. from Hoovers Hill Sta. 290 plus 00 to Davies Co. line Sta. 250 plus 25.7 Ohio Co., from Costello Bros. & Mays, Knoxville, Tenn., $50,206, N. E. Stone & Co., Madisonville, $53,344, Federal Constr. Co., Winchester, $54,758; 0.5 mi. Covington-Falmouth Rd. from Rogers St. Sta. 31 plus 10 to Latonia Ave. Sta. 58 plus 44 in Covington, Kenton Co., rein.-con., from O. F. Moore, Dayton, O., $23,657, O. P. Raymond, Cynthiana, $25,156, Metzel & O'Hearn, Covington, $26,533, rock asphalt, from Metzel & O'Hearn, Covington, $25,764, O. P. Raymond, Cynthiana, $29,474; 5.1 mi. Catlettsburg-Grayson Rd. from Cannonsburg, Sta. 0 plus 100 to Carter Co. line Sta. 272 plus 53, State Project 47, Sect. A, Federal Aid Project 8, Boyd Co., (1) slag base, (2) limestone base, from Federal Constr. Co., Winchester, (1) $222,067, (2) $212,878, Sutton Constr. Co, (1) $234,615, (2) $225,936, Hunt Forbes Constr. Co., Cattlesburg, (1) $266,067, (2) $266,067. Noted June 9.

★**O., Chagrin Falls**—Village let contract grading and paving Philomethian, May and Elm Sts., to Rowe & Giles, Chagrin Falls, $18,057; Church and Water Sts., to Cleveland Trinidad Paving Co., The Arcade, Cleveland, $38,357. Noted June 2.

★**O., Cleveland**—City let contract paving Woodland Ave. from East 55th to East 79th Sts., to Cleveland Trinidad Paving Co., The Arcade, $57,508. Noted May 19.

O., Cleveland—City received bids grading, draining, curbing and paving Behrwald Ave. from Pearl Rd. to West 35th St., from Roehl Bros., West 25th St. and Clark Ave., $27,216, Freshwater Paving Co., Natl. Bldg., $28,379; East 67th St. from Worley to Collier Aves., from Garland Bros., c/o Pavers Exch., $5,736, Burnett-Hathaway, c/o Pavers Exch., $5,838; Jeffries Ave. from Turney Rd. to East 86th St., from Bentley Bros., Union Bldg., $20,230, A. J. Pejsa, East 93rd St., $20,986; Coit Rd. from St. Clair Ave. to East 145th St., from G. B. Herring, 10839 Drexel Ave., $17,644, River Constr. Co., Schofield Bldg., $18,412.

O., Cleveland—City received bids grading, draining, curbing and paving (1) Joan Ave. from West Blvd. to West 105th St., (2) Chestnut Hill Dr. from Liberty Row to point 1,180 ft. north, involving 62,500 sq.ft. bituminous pavement on 6 in. concrete base, 5,060 cu.yd. grading and 6,128 cu.ft. stone curbing, etc., from Cleveland Trinidad Paving Co., The Arcade, (1) $18,-035, (2) $25,721; Pentley Bros., 1836 Euclid Ave., (2) $31,384.

★**O., Dayton**—Comrs. Montgomery Co. let contract paving Catalpa Dr. from Salem to Cornell Drives, involving 12,000 sq.yd. asphalt on concrete base, to W. I. Anderson, R. R. 5, $57,164. Noted June 9.

Mich., Detroit—City received bids June 21, grading, and shaping various valleys and paving with one course concrete with 2 x 6 in. retaining plank sides and medina headers. Bidders on this project can be obtained by writing Engineering News-Record.

★**Mich., Harrisville**—State Highway Dept. at office Bd. Rd. Comrs. Alcona Co., let contract grading, draining and surfacing 3.01 mi. Federal Aid Project 33, Sect. F, to W. T. Hill, Whittemore, $28,916. Noted June 2.

★**Mich., Ithaca**—State Highway Dept. at office Bd. Rd. Comrs. Gratiot Co., let contract grading, draining and surfacing 1.159 mi. State Trunk Line Rd. 461, Sects. A, B and C, to Palma Constr. Co., Ypsilanti, $39,302. Noted June 9.

★**Mich., Ludington**—State Highway Dept. at office Bd. Rd. Comrs. Mason Co., let contract grading, draining and surfacing 3.157 mi. State Trunk Line Rd. 11-23, Sect. C, to Mayer & Ryan, 4240 Calumet Ave., Chicago, Ill., $125,832. Noted June 9.

★**Mich., Mt. Pleasant**—State Highway Dept. at office Bd. Rd. Comrs. Isabella Co., let contracts grading, draining and surfacing 0.785 mi. State Trunk Line Rd. 14-17, to J. E. Johnson, Saginaw, $28,212; 1.768 mi. State Trunk Line Rd. 14-20, to Holmes, Bartling & Crane, Alma, $61,251.

★**Mich., Pontiac**—State Highway Dept. at office Bd. Rd. Comrs Oakland Co. let contract grading, draining and surfacing 1.68 mi. Assessment Dist. Rd. 392, Sect. 2, to W. O. Brown, 501 Vinton Bldg., Detroit, $84,815. Noted May 26.

★**Mich., St. Ignace**—State Highway Dept. at office Bd. Rd. Comrs. Machinac Co., let contract grading and draining 12.465 mi. State Trunk Line Rd. 12-21, to Fogelsonger & Madison, St. Ignace, $51,035. Noted May 19.

★**Mich., St. Joseph**—State Highway Dept. at office Bd. Rd. Comrs. Berrien Co., let contract grading, draining and surfacing 2.019 mi. State Trunk Line Rd. 11-40, to Vander Veen Constr. Co., Grand Rapids, $69,045. Noted June 2.

★**Mich., West Branch**—State Highway Dept. at office Bd. Rd. Comrs. Ogemaw Co., let contract grading, draining and surfacing 2.998 mi. State Trunk Line Rd. 76-9, Sect. A, to J. Orr, Standish, $34,709. Noted June 9.

★**Ill., Johnson City**—City let contract paving 15,000 sq.yd. in Dist. 2, to Kelly Bros., Carterville, $52,343. Noted June 9.

★**Wis., Elkhorn**—Road and Bridge Comn. Walworth Co. let contract surfacing 3.12 mi. Elkhorn-Lake Geneva Rd., concrete, to Universal Eng. Co., Eau Claire, $83,457.

Wis., Kewaunee—City received bids paving 4 blocks, concrete, from F. Wulf & Sons, Algoma. About $27,000.

Wis., La Crosse—Bd. Pub. Wks. received bids paving 7¼ mi. various streets, asphalt and gravel (asphaltic carpet coat), from Illinois Petroleum Products Co., 11 South La Salle St., Chicago, $98,000; La Crosse Stone Co., La Crosse, $112,000; J. F. Lee, Dubuque, Ia., $143,422 and $154,000.

Wis., Madison—Green Co. State Rd. and Bridge Comn. received bids building Belleville-New Glarus Rd., involving (1) 2,403 cu.yd. earth excav., (2) 497 cu.yd. rock excav. and 36,584 sq.yd. concrete surfacing, etc., from F. T. Fess, Madison, (1) $0.79 per cu.yd., (2) $2.40, (3) $1.69, total cost $100,586; McCullough & Cheney, 440 Temple Court, Minneapolis, Minn., (1) $1.15, (2) $3, (3) $1.67, $101,932; Lampert Constr. Co., Oshkosh, (1) $0.98, (2) $2.80, (3) $1.69, $102,458.

★**Wis., Milwaukee**—City let contracts to White Constr. Co., 68 Wisconsin St., paving American Ave. from Cleveland to Harrison Sts., $12,777, Pine St. from Montana to Idaho Sts., $16,632, Shea Ave. from South Pierce to National Sts., $15,730, all asphalt; to F. Banaszak, 1335 4th Ave., Louis Ave. from Atkinson to Lake Aves.,

Streets and Roads (Continued)

concrete, $14,444; to F. P. Coughlin Co., 30 North La Salle St., Chicago, 17th St. from Chambers to Center Sts., asphalt, $23,330; to Cutler Constr. Co., 886 46th St., 2 alleys, $3,301; to Clayton Constr. Co., 397 Farwell Ave., 1 alley, $2,926; to F. W. Blodgett, 204 Grand Ave., 1 alley, $2,960; to Bodemann Constr. Co., 801 Winnebago St., 3 alleys, $8,207.

★**Wis., North Milwaukee**—City let contract paving Green St., Commerce and Western Aves., concrete, to Kroening Constr. Co., 221 Grand Ave., Milwaukee, $79,575; alleys, to Kehrein Constr. Co., 11th St., Milwaukee, concrete paving $2.64, grading $1.40.

★**Ia., Clinton**—City let contract paving Bluff Blvd., 19th St. and Harrison Rd., to McCarthy Impvt. Co., 220½ Main St., Davenport, $3.94 per sq.yd., $74,757.

★**Ia., Oskaloosa**—Kahaska Co. let following contracts grading and draining, 17 mi. primary roads radiating out of Oskaloosa, involving 118,456 cu.yd. excav., 80,005 lin. ft. 6-10 in. tile and 42 tile intakes, etc., grading, to W. R. Grinnell, Denison, $38,-397; tile, to Mankato Constr. Co., Mankato, Minn., $8,982.

★**Ia., Sioux City**—City let contracts paving West Palmer St., and East 7th St. from Clark to Plymouth Sts., involving 10,380 sq.yd. concrete paving and 7,070 ft. concrete curb and gutter, to Western Asphalt Paving Co., 1st and Nebraska Sts., $68,251; South Royce St. and M. S. Ave. to 6th Ave., also South Patterson St., involving 5,100 sq.yd. concrete and 1,725 ft. concrete curbing, to Booth & Olson, 120 Virginia St., $3.44 per sq.yd. and $1 per ft. respectively.

★**Kan., Ellis**—City let contract paving portions Edwards, Adams, Williams, Franklin and Washington Sts., vertical fiber brick, to H. J. Taylor & Co., Larned, $3.51 per sq.ft. 5 in. base and $3.36 per sq.ft. 4 in. base, total cost $125,184.

★**Kan., Ft. Scott**—Bourbon Co., c/o N. Ausman, Clk., let contract paving 6.533 mi. Ft. Scott-Pittsburg Rd., 16 ft. wide, to F. Bechtelheimer, 917 North Quincy St., Topeka, $226,084.

★**Neb., Norfolk**—City let contract surfacing various streets, brick on concrete base, to Abel Constr. Co., 318-19 Terminal Bldg., Lincoln. About $35,000.

★**Tex., Dallas**—Dallas Co. let contracts improving (1) 2.04 mi. Dallas-Garland-Station of Bankhead Highway, (a) grading and draining, (b) surfacing with 2 in. asphalt topping, work involves, 10,531 cu.yd. roadway and 3,560 cu.yd. rock excav., 672.9 cu.yd. 1:2:4 and 172.8 cu.yd. 1:2½:5 concrete, 23,041 cu.yd. 2 in. asphalt, 23,830 cu.yd. 5 x 7 x 5 in. concrete base, 83,126 lb. reinforcing steel and 14,688 lb. wire mesh; (2) 8.8 mi. State Highway 1, between here and Garland, 25,352 cu.yd. borrow, 16,595 cu.yd. earth and 300 cu.yd. rock excav., 92,541 sq.yd. concrete base, 1,153.9 sq.yd. 1:2:4 and 133.9 sq.yd. 1:2:5 concrete, 87,957 sq.yd. 2 in. asphalt, to Smith Bros. & Healy Constr. Co., 308 Sumpter Bldg. (1a) $79,143, (2a) $218,518; Continental Asphalt & Petroleum Co., Andrews Bldg., (1b) $27,649, (2b) $105,549.

★**Tex., Haskell**—City let contract paving various streets, involving 25,000 sq.yd. 3 in. vertical fiber brick, Texaco asphalt filler, on 4 in. concrete base, to H. K. McCollum Constr. Co., Texas St. Bank Bldg., Ft. Worth. Noted June 16.

Cal., Los Angeles—Bd. Supervs. Los Angeles Co., received bids paving 5.38 mi. Hawthorne Ave. between Inglewood and Redondo Rds. 5 in. concrete reinforced with wire mesh, from Los Angeles Paving Co., 2900 Sante Fe Ave., $182,000; Kneen Paving Co., Dudley Bldg., Santa Monica, $196,200; Southwest Paving Co., 415 Washington Bldg., $197,900

Railways

PROPOSED WORK

Texas—Cisco & Northwestern Ry., Cisco, plans to build line from Breckenridge to Ivan. About $882,000. R. Q. Lee, pres.

Excavation and Dredging

PROPOSED WORK

Ill., Carrollton — Drainage — Comrs. Macoupin Creek D. D. plan to build system to drain 14,000 acres. About $300,000. Kelker, Gates & Deleuw, Conway Bldg., Chicago, engrs.

Ill., Mt. Carmel—Drainage—Comrs. Wabash and Lawrence Counties having plans prepared for drainage system. About $75,-000. Address G. C. Harvey, Sumner.

Utah, Dutchesne — Irrigation — Blue Bench Irrigation Dist. plans to sell $500,-000 bonds to irrigate 20,000 acres of land. F. M. Shelton, pres. Q. McDermit, Salt Lake City, engr.

Utah, Tooele—Irrigation—Tooele Valley Irrigation Co. plans to pump water from Utah Lake high enough to flow by gravity on lands near here and Grantsville, 45,000 acres of land involved. About $4,000,000. W. S. Marks, pres. I. H. Jacobs, Tooele, engr.

Utah, Tooele — Irrigation — Rush Valley Irrigation Co. plans to pump water from Rush Lake high enough to irrigate 20,000 acres west of here. I. H. Jacobs, Tooele, engr.

BIDS DESIRED

Miss., Cleveland—Ditch—Until July 5, by Comrs. Jones Bayou D. D., Bolivar Co., at office of J. C. Walker, atty., Cleveland, excavating Jones Bayou canal, involving 210,000 cu.yd. excav. W. W. Boone, Cleveland, civil engr. Noted Mar. 31.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**N. Y., New York**—Dredging—M. Hulbert, comr. Docks, Pier "A," foot of Battery Pl., North River, let contracts dredging in Boros of Manhattan, Bronx and Brooklyn, to H. Duboic Sons Co., 17 State St., (1) $5,566, (4) $5,950; P. S. Ross, Inc., (2) $10,118; F. E. Jones, 17 Battery Pl., (3) $20,120. Noted June 23.

Industrial Works

PROPOSED WORK

Mass., Brookline (Boston P. O.) — Gorfinkle & Barkin having plans prepared by H. F. Bryant, archt., 334 Washington St., for 1 story, 151 x 175 ft. brick and concrete garage, on Harvard St. About $60,000.

Mass., East Longmeadow—New England Steel Castings Co. plans to rebuild 1 story plant, on Shaker Rd., which was recently destroyed by fire. About $100,000. Architect not selected.

Conn., Stamford — Cohn & Abrams, 545 Main St., having revised plans prepared by W. R. Steinmetz, archt., 442 Atlantic Ave., for 3 story, 40 x 85 ft. mill construction factory, concrete foundation, on Beckley Ave. About $40,000. Noted May 5.

Conn., Thompsonville—Hinsdale, Smith & Co., 324 Main St., Springfield, Mass., rejected bids building 3 story, 60 x 125 ft. mill construction warehouse, on Central St., here. Project indefinitely postponed. Noted June 16.

N. Y., New York—One Hundred Thirty-Eighth St. Garage, Inc., c/o L. A. Sheinart, archt. and engr., 194 Bowery, having plans prepared for 1 story, 175 x 200 ft., brick and concrete garage, rein.-con. flooring, concrete foundation, on 138th St. and Alexander Ave. About $60,000.

N. Y., New York—Inter-City Fuel Co., 17 Battery Pl., having plans prepared by Parsons, Klapp & Brinkerhoff, archts. and engrs., 84 Pine St., for 2 story, 50 x 100 ft., brick, steel and concrete garage, rein.-con. flooring, concrete foundation, at 410 East 30th St. About $40,000.

N. Y., New York—New York Edison Co., 130 East 15th St., having plans prepared by W. Whitehill, archt. and engr., 12 Elm St., for 1 story, 25 x 60 ft. brick, steel and concrete sub-station, rein.-con. flooring, concrete foundation, at 38 Bowery. About $130,000.

N. J., Trenton—Huslander Engraving Co. having plans prepared by Fowler-Seaman Co., archts., Broad St. Bank Bldg., for 3 story, 40 x 60 ft., brick, concrete and steel factory, concrete foundation. About $40,000.

Pa., Monongahela—Downer & Dias, c/o Keystone Garage, Monongahela, had plans prepared for 2 story, 60 x 180 ft. brick and steel garage. About $50,000. Private plans.

Pa., Phila.—Phila. Paper Mfg. Co., River Rd., having plans prepared for 2 story, 100 x 180 ft. storage plant on River Rd. and Fountaine St. About $200,000. Private plans.

Pa., Reading—City having plans prepared by L. I. Klander, engr., Pennsylvania Bldg., Phila., for 50 x 100 ft. power plant along Madden Creek. About $250,000.

N. C., Chapel Hill—University of North Carolina plans to extend and enlarge lighting, water and sewerage systems, at University, here. About $100,000. J. B. Grimes, chn. building comn. T. C. Atwood, Chapel Hill, engr.

O., Cleveland—Austin Co., 16112 Euclid Ave., having plans prepared for 1 and 2 story, brick and steel factories, brick foundations, on East 200th St. and St. Clair Ave. About $75,000. Private plans.

O., Cleveland—Cleveland Electric Illuminating Co., Illuminating Bldg., having plans prepared by A. Gallaher, archt., Illuminating Bldg., for 1 story, brick and steel power sub-station, brick foundation, on Cedar and Lee Rds. About $40,000.

O., Cleveland — Prinz-Biederman Co., West 6th St. and Lakeside Ave., plans to build 3 story, brick and concrete factory, brick and concrete foundation, on McCracken Rd. W. B. Fish, treas. About $250,000. Architect not selected.

Ind., Evansville—Evansville College, 519 Vine St., having plans prepared by Miller, Fullerwider & Dowling, archts., 6 North Michigan Ave., Chicago, for 2 story power plant and gymnasium, brick, rein.-con. flooring. About $400,000.

Ind., Elkhart—Reid Furniture Co. having plans prepared by E. H. Turnock, archt., Elkhart, for 2 story, 50 x 200 ft. brick, factory, rein.-con. flooring. About $100,000.

Ind., Indianapolis—Bookwalter Ball Co., Century Bldg., having plans prepared for 1 story, 50 x 100 ft. concrete and brick printing plant, rein.-con. flooring, at 1520 North Capitol Ave. About $50,000. Private plans.

Ind., Indianapolis — Terminal Building Corp., c/o Fletcher Trust Co., Market and Pennsylvania Sts., plans to build 7 story, 200 x 245 ft. brick, concrete and steel warehouse, rein.-con. flooring, on South Pennsylvania St. About $225,000. E. E. Metzger, pres.

Ind., Princeton—Hudson Baking Co. having plans prepared by Fowler, Chappel & Troutman, archts., Evansville, for 2 story, 60 x 130 ft. bakery, brick. About $40,000.

Ind., Richmond—Grim Auto Co., 7th and Sailor Sts., having plans prepared by C. E. Werking & Son, archts., Palladium Bldg., for 2 story, 71 x 104 ft. garage and service station, concrete, brick and steel, rein.-con. flooring, on 7th St. About $75,000.

Ind., Richmond — The Peelle Co., c/o Richmond Safety Gate Co., North and Railroad Sts., having plans prepared by J. W. Mueller & Co., archts., Richmond, for 2 story, 260 x 500 ft. brick, steel and rein.-con. factory. About $200,000.

Ind., South Bend—India Rubber Corp., 310 West Ewing St., having plans prepared by W. W. Schnieder, archt., 120 South Main St., for 2 story, brick addition to rubber factory. About $50,000.

Ind., Terre Haute — Terre Haute Boiler Wks., 1225 7th Ave., plans to build 1 story, brick and steel factory, rein.-con. flooring, on North 13th St. About $75,000. Private plans.

Mich., Saginaw—Booth & Boyd Lumber Co., Baum and Holden Sts., having plans prepared by Cowles & Mutscheller, archts., Chapel Blk., for 1 story, 72 x 400 ft. factory, frame construction, concrete foundation. About $40,000.

Ill., Aurora—Miller, Bryan, Pierce Co., 225 River St., having plans prepared by Lockwood Greene Co., archts., 385 Dearborn St., Chicago, for 3 story, 60 x 150 ft. brick, rein.-con. and steel factory. About $160,000.

Ill., Chicago—Hinckley & Schmitt, 420 West Ontario St., plans to build 7 story, 75 x 100 ft. rein-con. factory, on Ohio and Orleans Sts. About $150,000. Architect not announced.

Ill., DeKalb—Daily Chronicle, c/o E. J. Raymond, having plans prepared by F. B. Gray, archt., Coulter Bldg., Aurora, for 2 story, 42 x 115 ft., brick, steel and rein.-con. printing plant. About $75,000.

Ill., Oregon—Paragon Fdry. Co. having plans prepared by N. E. Buser, archt., Mt. Morris, for 1 story, 100 x 200 ft. brick and steel foundry. About $50,000.

Wis., Milwaukee—City having plans prepared by C. E. Malig, archt., City Hall, for 1 story, 50 x 125 ft. pipe storage house, brick, concrete and steel, rein.-con. flooring, concrete foundation, on Clinton St. About $50,000.

Wis., Milwaukee—Milwaukee Bag Mfg. Co., 206 South Water St., having plans prepared for 3 story, 40 x 85 ft. addition to factory, brick and concrete or brick and timber, concrete foundation, on South Water St. Federal Eng. Co., Stephenson Bldg., engrs.

Industrial Works (Continued)

Minn., St. Paul—Twin City Motor Bus Co., 344 North Exchange St., receives bids about July 1, building 1 story, 120 x 150 ft. brick and stucco garage and office, on 5th St. near 7th St. About $40,000. H. A. Sullwold, 643 Endicott Bldg., archt.

Mo., St. Louis—Sieloff Packing Co., c/o E. Sieloff, pres., 4339 Natl. Bridge Rd., having plans prepared by Wedemyer & Nelson, archts., Wainwright Bldg., for 2 story, 120 x 120 ft., brick and rein.-con. storage plant, on Sacramento and Newstead Sts. About $75,000.

BIDS DESIRED

N. H., Charlestown—Bowen Motor Car Co. receiving bids building 2 story, 57 x 165 ft. brick and rein.-con. garage, rein.-con. flooring, concrete foundation, on Main St. About $80,000. G. W Griffin, 72 North Main St., Concord, archt.

Conn., Ansonia—Lockwood, Greene & Co., engrs. and archts., 101 Fark Ave., New York City, receiving bids building 2 story, 75 x 240 ft. brick and rein.-con. addition to plant, rein.-con. flooring, concrete foundation, for Ansonia O. & C. Co., 153 Main St. About $125,000.

Conn., Hartford—Buck & Sheldon Inc., engrs. and archts., 60 Prospect St., receiving bids building printing plant, 3 story, 60 x 82 ft. with ell, brick and concrete, rein.-con. flooring, concrete foundation, on High St., for Graphite Arts Co., 74 Union Pl. About $80,000. Noted June 23.

Conn., Waterbury—Cudahy Packing Co., 592 West Main St., receiving bids building 1 story, brick and concrete warehouse, rein.-con. flooring, concrete foundation, on Sperry St. About $50,000. Private plans. Noted Sept. 30.

O., Cleveland—Natl. Carpet Cleaning & Rug Mfg. Co., 1971 West 50th St., receiving bids building 2 story, 40 x 123 ft., brick and steel factory, brick foundation, on West 50th St. and Lorain Ave. About $75,000. Whitworth & Johnson, 413 Engineers Bldg., archts. Noted Feb. 17.

Ind., Indianapolis—F. D. Gardner Co., 221 East Maryland St, receiving bids building 2 story, 80 x 180 ft. packing plant, rein.-con. tile and brick, rein.-con. flooring, along banks of White River. About $75,000. Wannin, Wetsch & Co., 563 William St., Buffalo, N. Y., archts.

Mich., Traverse City—Until July 13, by O. C. Moffatt, city clk., building hydro electric power plant 13 mi. from here; advertised in this issue.

Wis., Kaukauna—P. H Pagel Auto Co., receiving bids building 1 story, 60 x 75 ft. steel and hollow tile garage, rein.-con. flooring, concrete foundation. About $40,000. H. O. Weldon, 10 South La Salle Ave., Chicago, archt.

Wis., Milwaukee—Until July 2, by Milwaukee-Western Fuel Co., 120 Wisconsin St., building 1 and 2 story, 125 x 200 ft., brick, concrete and steel garage, rein.-con. flooring, concrete foundation, on South Pierce St. About $80,000. Klug & Smith, 69 Wisconsin St., archts. and engrs.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**Me., Auburn**—Darling Auto Co. let contract building 2 story, brick garage, to J. A. Greenleaf & Sons, Auburn. About $40,000. Noted April 28.

★**Vt., Rutland**—W. H. Williams let contract building 1 story, 68 x 129 ft. brick service station, to C. G. Noyes, Rutland. About $50,000.

★**Mass., Dorchester** (Boston P. O.)—T. G. Buckley let contract building 1 story, 52 x 101 ft. concrete storehouse, to Wilson & Tomlinson, 70 Milk St., Boston. About $50,000.

★**Mass., Malden** (Boston P. O.)—Malden Knitting Mills, 62 Franklin St., will build 4 story, 42 x 150 ft. brick factory, on Eastern Ave. About $75,000. Work will be done by day labor. S. S. Eisenberg, 46 Cornhill, Boston, archt.

★**Mass., Springfield**—C. P. Chase Co., 68 Birnie Ave., let contract building 1 story, 40 x 120 ft. lumber mill concrete, rein.-con. flooring, concrete foundation, to J. G. Roy & Sons, 21 Silver St.

★**R. I., Pawtucket**—J. W. Muirhead will build 1 story, 100 x 100 ft. brick garage and store, concrete foundation, on Samuel Ave. About $40,000. Work will be done by day labor. Private plans.

★**N. Y., Elmhurst**—S. Augustine & Co., 352 4th Ave., New York City, let contract building 3 story, 80 x 150 ft., brick, steel and concrete factory, concrete foundation, on Laurel Hill Blvd., here, to Gretsch Eng. Corp., 103 Park Ave., New York City. About $100,000.

★**N. Y., New York**—S. J. Schwarzler, c/o S. J. Kessler, archt. and engr., 529 Courtlant Ave., will build 1 story, 85 x 200 ft. and 4 story, 85 x 100 ft. brick and steel garages, rein.-con. flooring, concrete foundations, on 174th St. ad Morris Ave., Bronx. Work wil be done by day labor.

★**Ind., Indianapolis** — The Best Grand Laundry, North Capitol Ave., let contract building 2 and 3 story, 67 x 200 ft. brick and terra cotta laundry, rein.-con. flooring, to Brandt Bros., Chamber of Commerce. About $100,000.

★**Ind., Indianapolis**—Coburn Warehouse Co., 211 West Georgia St., let contract building 2 story, 70 x 125 ft. concrete, brick and steel warehouse, rein.-con. flooring, at 213 West Georgia St., to Hall Constr. Co., City Trust Bldg. About $75,000. Noted March 10.

★**Wis., Manitowoc** — Juul & Smith, archts., Imig Bldg., Sheboygan, let contract to F. J. Sporer, 702 Huron St., building 2 story, 60 x 120 ft., rein.-con., brick and steel garage, rein.-con flooring, brick foundation, on 8th St., for Dicke Motor Co., c/o W. C. Dicke, Franklin and 11th Sts. About $75,000. Noted March 31.

Wis., Milwaukee—A. Dietrich, c/o Rosman & Wierdsma, archts., 424 Jefferson St., let contract building 1 story, 60 x 120 ft., brick, concrete and steel, garage and repair shop rein.-con. flooring, concrete foundation, on Lisbon Ave., to W. O. Kasdorf, 397 Grand Ave., Milwaukee. About $42,000.

★**Wis., Milwaukee**—Eagle Lye Works, 32 Erie St., let contract building 3 story, 50 x 60 ft., brick and timber addition to factory, concrete foundation, on Erie St., to W. G. Williams, 352 Jefferson St. About $40,000; cost plus percentage basis.

★**Wis., Milwaukee**—Quality Products Co., 638 Arthur Ave., let contract building 2 story, 50 x 65 ft. cold storage plant on Arthur Ave., to Meredith Bros. Co., 1043 Kinnickinnic Ave. About $40,000.

★**Wis., Oshkosh**—Hollister Auto Co., 33 Algonia St., let contract building 2 story, 80 x 116 ft., brick, concrete and steel garage, rein.-con. flooring, concrete foundation, to C. R. Meyer & Sons, 50 State St. About $60,000. Noted April 28.

★**Minn., Minneapolis**—Sanitary Mattress Mfg. Co., 511 1st Ave., N. E., let general contract building 2 story, 65 x 157 ft. brick and concrete factory on Bway. and Tyler St. N. E., to E Nord, 3423 Girard Ave. N. About $40,000 on time-material basis. Noted April 21.

★**Mo., Unionville**—City let contract building 1 story, 60 x 70 ft. light, water and filter plant, to New York Continental Filter Co., Hutney, N. J. About $84,000. Noted May 19.

★**Ont., Petrolea**—Canadian Oil Co. will build 1 story, 50 x 80 ft. boiler house and 50 x 50 ft. pump house, also new brick stack 110 ft. high. About $50,000. Work will be done by day labor.

Buildings

PROPOSED WORK

Me., Bath — School — Bd. Educ. plans to bulid brick and steel. About $150,000. Architect not selected.

Me., Calais—School—School Bd. plans to build 2 story, brick and steel. About $75,000. Architect not selected.

Me., Waterville—School—School Dept. plans to build 2 story, brick and steel. About $125,000. Architect not selected.

Me., Waterville—Gymnasium—Colby College, Colby, plans to build 1 story, brick and steel gymnasium, also large athletic field, on campus. About $75,000. Architect not announced.

N. H., Laconia — School — School Dept. plans to build 2 story, brick and steel. About $175,000. Architect not selected.

Mass., Amherst—Club—Phi Kappa Psi Fraternity, c/o Massachusetts Agricultural College, having revised plans prepared by Putnam & Cox, archts., 114 State St., Boston, for 3 story, 40 x 71 ft. brick and brownstone, rein.-con. flooring, concrete foundation, on Northampton St. About $75,000.

Mass., Brockton — School — Bd. School Comrs. plans to build 2 story, school to replace Packard School. About $175,000. Architect not selected.

Mass., Chicopee — School — Bd. School Comrs. plans to build 2 story, brick and steel in Fairview section. About $80,000. Architect not selected.

Mass., Chicopee Falls — Church — St. Joachim Roman Catholic Church, 202 Main St., having plans prepared by G. H. Fugere, archt., Main St., for 1 story, 60 x 164 ft. white stone and steel, on Main and Belcher Sts. About $150,000. G. H. Gagnon, pastor.

Mass., Lawrence—Store and Office—A. B. Sutherland, having plans prepared by Ashton, Huntress & Alter, archts., 477 Essex St., for 4 story, 25 x 91 ft. brick, concrete foundation, on Essex St. About $75,000.

Mass., New Bedford — Church — St. Andrews Church having plans prepared by C. C. Coveney, archt., 184 Boylston St., Boston, for 1 story, 40 x 115 ft. brick, stone and steel, on Acushlet St. About $75,000.

Mass., Springfield — Bank and Office — Atlas Trust Co., 455 Main St., plans to build 10 story, brick, concrete and steel, rein.-con. flooring, on Main and Court Sts. Architect not selected.

Mass., Springfield — Bank and Office — Chicopee Natl. Bank, 480 Main St., plans to build 10 story, brick, concrete and steel, on Main and Sanford Sts. About $700,000. Architect not selected.

Mass., Springfield — Hotel — Bridgeway Hotel, Bridge St., had plans prepared by Huestis & Huestis, archts., 145 Chestnut St., for 11 story, 80 x 112 ft. brick, stone, steel and concrete addition, rein.-con. flooring, concrete foundation, on Bridge St. and Bway. About $1,000,000.

Mass., Springfield—Temple—Masonic Hall Assn., 115 State St., had plans prepared by McClintock & Craig, archts., 33 Lyman St., for 5 story, 133 x 275 ft. marble, brick, terra cotta, rein.-con. and steel, rein.-con. flooring, concrete foundation, on State St. About $1,000,000. G. C. Glover, 8 Beacon St., Boston, associated archt. Noted Feb. 10.

R. I., Newport—School—Sheffield School Bldg. com. having revised plans prepared by T. S. L. Weaver, archt., 12 Newport Ave., for 2 story, concrete, brick and steel, rein.-con. flooring, concrete foundation, on Bway. and Vernon St. About $160,000.

Conn., Bridgeport—School and Hall—St. Patricks Roman Catholic Church, 865 North Ave., plans to build 3 story, brick. About $100,000. J. C. Lynch, pastor. Architect not selected.

Conn., Bristol—Fire House—Bd. Fire Comrs. having plans prepared by H. A. Havden, archt., 175 Main St., for 3 story, brick, concrete and steel. About $100,000.

Conn., Hartford — Lodge — Knights of Pythias, 904 Main St., plans to build 3 story, brick and steel. About $75,000. Architect not selected.

Conn., Hartford—Store and Office—Dolgin & Schulman Dept. Store, 274 Park St., having plans prepared by E. T. Wiley, archt., 75 Pratt St., for 3 story, brick and steel addition. About $75,000.

Conn., Hartford—Theater and Business—Lyric Amusement Co., Inc., 274 Park St., having plans prepared by E. T. Wiley, archt., 75 Pratt St., for 1 and 3 story, brick, steel and concrete, on Broad and Park Sts. About $150,000.

Conn., Meriden—Church—First Church of Christ Scientist, 658 Colony St., having plans prepared by L. Hamilton, archt., Meriden, for 1 story, brick and steel, at Bailey Park. About $150,000. Orr & DeGrella, Exch. Bldg., New Haven, associated archts.

Conn., Meriden — Church — Our Lady of Mt. Carmel Roman Catholic Church having plans prepared by Marchetti & D'Avino, archts., 756 Main St., Hartford, for 1 story, 50 x 125 ft. brick and stone, on Washington and Grove Sts. About $100,000.

Conn., Meriden — Store and Business — Griswold, Richmond & Glock Co., 2 West Main St., had plans prepared by D. Bloomfield, archt., 129 State St., for 2 and 3 story, 118 x 150 ft. brick, concrete and steel, rein.-con. flooring, concrete foundation. About $150,000.

Conn., New Britain—Synagogue—Bethel Congregation, 398 Main St., plans to build 1 story, brick and steel, on Summer St. About $100,000. Architect not announced.

Buildings (Continued)

Conn., New Haven—School—St. Michaels Roman Catholic Church, c/o Apostolic Sisters of the Sacred Heart, 295 Greene St., plans to build 3 story, brick and rein.-con. addition, on Greene St. About $150,000. Architect not selected.

Conn., Torrington—Store—W. W. Mertz Co., 84 Main St., had plans prepared by E. H. Waterbury, archt., 60 Main St., for brick, concrete and steel, rein.-con. flooring, concrete foundation. About $100,000.

Conn., Warehouse Point—Home—Comrs. Hartford Co. Home having plans prepared by M. J. Unkelbach, archt., 162 Main St., New Britain, for 1 story, 40 x 60 ft. brick dining building, two 2 story, 40 x 150 ft. dormitories and two 1 story, 36 x 65 ft. frame structures. About $125,000. Noted June 23.

Conn., Waterbury—Business—S. J. Baer, 81 East Main St., having plans prepared by C. J. Bailey, archt., 95 Bank St. for 3 story, brick and steel, on Thomaston Ave. About $75,000. Noted March 17.

Conn., Waterbury—School—St. Margarets School, Grove and Cook Sts., had plans prepared by Murphy & Dana, archts., 331 Madison Ave., New York City, for 3 story, brick and steel addition, rein.-con. flooring, concrete foundation. Cost between $100,000 and $125,000. Noted Nov. 4.

Conn., West Haven (New Haven P. O.—Theater and Store — H. L. Raeder, 27 George St., New Haven, had plans prepared by Brown & Van Beren, archts., 185 Church St., New Haven, for 1 and 2 story, brick, steel and concrete, on Campbell Ave., here. About $100,000.

Conn., Windsor—Business and Theatre—A. W. Lovell, Windsor Ave., having plans prepared by F. C. Walz, archt., 407 Trumbull St., Hartford, for 2 story, 75 x 110 ft. and 50 x 90 ft. brick and steel, on Central St.

N. Y., Brooklyn—Dance Hall and Store—W. C. Winters, archt. and engr., 106 Van Siclen Ave., soon lets contract building 3 story, 100 x 100 ft., brick, steel and stone, concrete foundation, on Fulton St., for H. Behr, c/o architect. About $85,000.

N. Y., Buffalo—Schools—Bd. Educ., 1401 Telephone Bldg., rejected bids building Intermediate Schools 2, 6, 7, 8, 9, 11, 12 and Elementary Schools 1 and 9, additions to Primary School 21 and Elementary Schools 21 and 60. Buffalo Architects Assn., 232 Delaware Ave., archts. Noted April 28.

N. Y., East Syracuse—High School—Bd. Educ. having plans prepared by M. L. King, archt. and engr., Snow Bldg., Syracuse, for Junior and Senior High School, brick. About $250,000.

N. Y., Flushing—Theater—Long Island Theater Corp., c/o W. A. Swasey, archt. and engr., 101 Park Ave., New York City, having plans prepared for 88 x 136 ft., brick, steel and stone, concrete foundation, on Main St. and Bway. About $150,000. L. J. Griffin, pres.

N. Y., Jordan—High School—Bd. Educ. having plans prepared by J. A. Randall, archt. and engr., S. A. & K. Bldg., Syracuse, for 2 story, 66 x 77 ft., rein.-con., brick and steel addition, rein.-con. flooring. About $100,000.

N. Y., New York—Apartment—M. Cohn, c/o I. Margon, archt. and engr., 355 East 149th St., soon receives bids building 5 story, 110 x 125 ft., brick, steel and stone, concrete foundation, on 231st St. and Kingsbridge Ave., Bronx. About $250,000. Noted June 9.

N. Y., New York—Apartment—W. J. Diamond, 1646 Monroe Ave., having plans prepared by C. S. Clark, archt. and engr., 441 Tremont Ave., for 6 story, 95 x 125 ft., brick, steel and stone, concrete foundation, at 525 West 162nd St. About $225,000.

N. Y., New York—Apartments—F. Johnson, 30 East 42d St., soon receives bids building three 6 story, 100 x 100 ft., brick, steel and stone, on 156th St. and Southern Blvd., Bronx. About $175,000 each. C. Kreymborg, 2534 Marion Ave., archt. and engr.

N. Y., New York—Apartment—Valhalla Corp., c/o Moore & Landseidel, archts. and engrs., 3d Ave. and 148th St., having plans prepared for 5 story, 92 x 122 ft., brick, steel and stone, concrete foundation, on Ryer Ave. near 181st St. About $350,000.

N. Y., New York—Apartments—I. Weinstein, 2385 Grand Concourse, had plans prepared by C. Kreymborg, archt. and engr., for two 5 story, 100 x 160 ft., brick, steel and stone, concrete foundations, on Kingsbridge Rd. and 194th St., Bronx. About $200,000 each.

N. Y., New York — Apartment — Wogle Holding Co., 585 Grand Concourse, having plans prepared by C. Kreymborg, archt. and engr., 2534 Marion Ave., for 5 story, 100 x 110 ft., brick, steel and stone, concrete foundation, on Kingsbridge Rd. near 194th St. About $175,000.

N. Y., New York — Office — Chamber of Commerce, 65 Liberty St., having plans prepared by Helmle & Corbett, archts. and engrs., 190 Montague St., Brooklyn, altering 4 story, brick and stone. About $150,000.

N. Y., New York — Sanitarium — C. W. Fitch, c/o K. F. J. Seifert, archt. and engr., 153 East 40th St., having plans prepared for 2 story, brick, steel and stone, concrete foundation, on Clinton Ave. near 183d St., Bronx. About $80,000.

N. Y., New York—Store—Saks & Co., Bway. and 33d St., having plans prepared by Starrett & Van Vleck, archts. and engrs., 9 East 40th St., for 9 story brick, steel and stone, concrete foundation, on 5th Ave. and 50th St. About $2,000,000.

N. Y., Syracuse — School — City voted $200,000 bonds to build grammar and junior high school.

N. J., Bordentown — School — State Bd. Educ., State House, Trenton, having plans prepared by Guilbert & Betelle, 546 Broad St., Newark, and Arnold & Moses, Merchantville, archts., for 2 story, 80 x 160 ft., brick and steel addition, to include dining room and dormitory, here. About $160,000. Noted March 31.

N. J., Newark—Y. M. H. A. and Y. W. H. A. having sketches made by F. Grad, archt. and engr. 245 Springfield Ave., for 96 x 176 ft., brick, steel and stone, concrete foundation, on High and West Kinney Sts. About $500,000. Noted April 28.

N. J., New Brunswick — College — New Jersey Agricultural College having plans prepared by A. D. Mills, archt., Trenton, for womens' college here. About $100,000.

N. J., Princeton—Club House—Cloister Inn Club plans to build club house. About $100,000. A. W. Kelsey, 1530 Chestnut St., Phila., archt.

N. J., Rutherford—High School—Bd. Educ. having revised plans prepared by Rasmussen & Wayland, archts. and engrs., 252 West 46th St., New York City, for 2 story, brick and stone, brick foundation. About $325,000. Noted Jan. 20.

N. J., Trenton—Dormitory—New Jersey Hospital, Asylum Rd., having plans prepared by A. D. Mills, archt., Trenton, for dormitory. About $225,000.

N. J., Trenton — Home — Natl. Brotherhood of Operative Potters, Mechanic Bldg., plans to build home. About $200,000. F. H. Hutchins, Amer. Mechanic Bldg., pres. Architect not selected.

N. J., Trenton—Lyceum—Central Labor Union, 47 North Clinton Ave., plans to build 8 story, 110 x 180 ft. lyceum. About $1,000,000. F. J. Schnorbus, 362 Cleveland Ave., interested. Architect not selected.

N. J., Trenton—School—State Bd. Educ., c/o A. Pope, Hamilton and Chestnut Sts., having plans prepared by Guilbert & Betelle, archts., 2 Lombardi St., Newark, and A. H. Moses, archt., 136 South 4th St., Phila., for 3 story, school for mute, on Scudder Farm. About $350,000. Noted May 12.

Pa., Harrisburg — Church — St. Pauls Lutheran Church having plans prepared by J. A. Dempwolf, archt., York, for 2 story, 65 x 90 ft. stone at Riverside. About $100,000.

Pa., Hooversville — Bank — First Natl. Bank plans to build 3 story, 86 x 100 ft. brick, steel and stone on Main St. About $125,000.

Pa., Hooversville—Lodge—Equity Lodge 156 of Knights of Pythias, plans to build 3 story, 110 x 120 ft. concrete and brick on Main St. About $75,000.

Pa., Newton — Temple — Masonic Lodge having preliminary plans prepared by H. R. Packer, archt., 129 South 5th St., Phila., for 2 story 38 x 68 ft. About $75,000.

Pa., Phila. — Bank and Apartment — Brown & Stevens, 427 South Broad St., plans to build 5 story, 50 x 170 ft. on 422-426 Broad St. About $133,000. Architect not selected.

Pa., Phila.—Sunday School—Presbyterian Church, 45th and Osage Sts., having plans prepared by E. A. Whiteman, archt., Herd Bldg., for 2 story, 83 x 92 ft. on Broad and Federal Sts. Cost to exceed $100,000.

Pa., Renovo — Lodge Home — Renovo Lodge of Elks plans to build 3 story, 50 x 130 ft. brick and steel, on 44th St. and Erie Ave. About $75,000. L. M. Griffey, exalted ruler.

Pa., Southampton—School—School Dist. having preliminary sketches made by H. S. Parker, archt., 129 South 5th St., Phila., for 2 story school. About $75,000.

Md., Salisbury—Church—G. E. Savage, archt., Witherspoon Bldg., Phila., preparing preliminary plans for 2 story, church. About $125,000. Owner's name withheld.

Md., Baltimore—Store—N. J. Meyerberg, 210 North Calvert St., having plans prepared by J. E. Moxley, archt., 851 Equitable Bldg., for store building. About $100,000.

Md., Baltimore — Theater — Pearce & Scheck, Knickerbocker Bldg., having preliminary plans prepared by Zink & Sparklin, archts., Munsey Bldg., Wash., D. C., for theater. About $75,000.

Md., Salisbury — Hospital — Peninsula General Hospital, Locust and South Division Sts., having preliminary plans prepared by Owens & Sisco, archts., Continental Bldg., Baltimore, for hospital. About $150,000. H. V. Wise, supt.

D. C., Wash.—Office—F. Lake, 903 New York Ave. N.W., having plans prepared for 10 story, 400 room, brick and stone, on 14th and K Sts. About $1,500,000. Private plans.

N. C., Statesville — School — City voted $150,000 bonds to build school.

Fla., Bradentown—Bank—First Natl. Bank having plans prepared by F. J. Kennard, archt., 409 Amer. Bank Bldg., for 2 story, 86 x 100 ft., rein.-con., brick, stone and marble, reni.-con. flooring. About $75,000.

Fla., Orlando—Apartment—W. H. Schibley and assistants, c/o J. M. Cheney, had plans prepared by F. H. Trimble, archt., Orlando, for 3 story, tile and steel. About $250,000.

Fla., West Palm Beach—Jail—Palm Beach Co. having plans prepared by J. A. Williams, archt., West Palm Beach, for 2 story, 40 x 105 ft., brick, concrete and steel, rein.-con. flooring. About $75,000. R. F. Goodman, West Palm Beach, engr.

Ky., Morganfield — Memorial — Memorial Coliseum and Community Bldg. Assn. having plans prepared by A. E. Neucks, archt., 515-16 Woods Bldg., Evansville, Ind., for 2 story, 83 x 110 ft., brick and stone, rein.-con. flooring. About $75,000.

O., Athens—Community House—Ohio Bd. Administration, Columbus, plans to build community house, at State Hospital, here. About $75,000.

O., Canton—Bank and Office—First Natl. Bank, Tuscarawas St. and Market Ave., plans to build 12 story, 84 x 87 ft., on Tuscarawas St. and Market Ave. About $500,000. Architect not selected.

O., Cleveland—Apartment—W. B. Gongwer, Federal Bldg., having plans prepared by W. S. Longee, archt., 500 Marshall Bldg., for 3 story, brick and timber, on Lennox Rd. near Euclid Ave. About $75,000.

O., Cleveland—Club—Forest City Athletic Club, c/o F. L. Brockman, chn., 6523 Euclid Ave., plans to build brick, steel and concrete, rein.-con. flooring, brick and concrete foundation. About $2,000,000. Architect not selected.

O., Cleveland—Clubhouse—Grand Area of Fraternal Order of Eagles, c/o J. W. Reynolds, clk., 2226 East 55th St., plans to build 3 story, brick, steel and concrete, rein.-con. flooring, brick and concrete foundation. About $500,000. Architect not selected.

O., Cleveland—Commercial—J. Babin, 827 Superior Ave., plans to build 1 or 2 story, brick and steel, brick foundation, on Euclid Ave. and East 101st St. About $100,000. Architects name withheld.

O., Cleveland—Commercial—J. Bassiches, Society for Savings Bldg., plans to build 3 story, 71 x 130 ft., brick and steel, brick foundation, on East 9th St. and Hamilton

Buildings (Continued)

Ave. About $75,000. A. Sharowski, 2045 Marlowe Ave., Lakewood, archt.

O., Cleveland—Commercial—C. De Witt, Natl. City Bldg., plans to build 4 to 6 story, 97 x 198 ft., brick and concrete, rein.-con. flooring, brick foundation, at 2831 Prospect Ave. About $150,000. Architect not selected.

O., Hinckley—High School—Bd. Educ. having plans prepared by H. Swigart, archt., 18210 Olympia Rd., Cleveland, for 2 story, 4 room, rein.-con., brick and steel addition, rein.-con. flooring, concrete and brick foundation. About $75,000. I. F. Waldo, Brunswick, Clk.

O., Dover—High School—Bd. Educ. having preliminary plans prepared by Allen-Osborn Co., archts., Rose Bldg., Cleveland, for 2 story, brick, steel and concrete, rein.-con. flooring, brick and concrete foundation. About $125,000. A. E. Weston clk. Noted May 19.

O, Berea — Hospital — Berea Hospital Assn., c/o A. A. Loomis, having preliminary plans prepared by V. Redding, archt., Mansfield, for 3 story, 100 room, rein.-con., brick and steel, rein.-con. flooring, concrete and brick foundation, on Front St. About $150,000.

O., Cleveland—Station, Commercial and Market—O. P. and N. J. Van Swearingen, Marshall Bldg., plan to build 3 story, 100 x 250 ft., rein.-con., brick and steel rein.-con. flooring, brick and concrete foundation, on East 93d St. and Woodhill Rd. About $150,000. W. Pease, 613 Marion Bldg., archt. and engr.

O., Cleveland — Hospital — Cleveland Catholic Diocese, c/o W. A. Scullen, East 9th St. and Superior Ave., plans to build 3 story, rein.-con., brick and steel, rein.-con. flooring, brick and concrete foundation, on Ansel Rd. and Superior Ave. About $300,000. Architect not selected.

O., Cleveland—Market and Commission House—Cleveland Growers Marketing Co., c/o J. Hoag, pres., Rocky River, having preliminary plans prepared by Watson Eng. Co., Cook Bldg., for 3 story, 265 x 305 ft., brick and concrete, on Woodland Ave. near East 9th St. About $200,000.

O., Cleveland — Orphanage — Catholic Charities Corp., c/o W. F. Lyon, Century Bldg., plans to build orphanage to include power house and administration buildings, brick, concrete and steel, rein.-con. flooring, brick and concrete foundation, on State Rd. near Bean Rd. About $300,000. Architect not selected. Noted July 29.

O., Cleveland—Station, Commercial and Market—O. P. and N. J. Van Swearingen, Marshall Bldg., plan to build 3 story, 80 x 120 ft., rein.-con., brick and steel, rein.-con. flooring, brick and concrete foundation, on East 116th St. and Shaker Blvd. About $75,000. W. Pease, 613 Marion Bldg., archt. and engr.

O., Dayton—Office—Amer. Bldg. & Savings Assn., South Main St., plans to build 13 story, 30 x 80 ft., brick and rein.-con. addition, rein.-con. flooring, concrete foundation, on 3d St. About $150,000. Architect not selected.

O., Defiance — Bank — Security Loan & Trust Co. having plans prepared by A. M. Strauss, archt., 705 Schraff Bldg., Ft. Wayne, Ind., for 2 story, 25 x 132 ft., brick and terra cotta, rein.-con. flooring. About $75,000.

O., East Cleveland (Cleveland P. O.)—Apartment—J. Laronge, c/o J. H. Dickman, 214 Williamson Bldg., Cleveland, plans to build 3 story, brick and steel, brick foundation, on Euclid and Allendale Ave. About $100,000. Private plans.

O., Elyria—School—Bd. Educ. having plans prepared by R. S. Silsby, archt., 901 Lorain County Bank Bldg., for 2 story, brick, steel and concrete, rein.-con. flooring, concrete and brick foundation, on Western Heights. About $225,000. Phegley & Szekeley, 5716 Euclid Ave., Cleveland, engrs.

O., Euclid—Theatre and Commercial—E. L. Striebinger, 1108 Ullmer Bldg., having plans prepared by P. H. Luzius, archt., 419 Erie Bldg., Cleveland, for 2 story, 50 x 135 ft., brick and concrete, brick foundation, on Euclid Ave. About $150,000.

O., Gallapolis—Hospital—Ohio Bd. Administration, Columbus, plans to build hospital, at Institution for Epileptics, here. About $100,000.

O., Lancaster—Schools—Ohio Bd. Administration, Columbus, plans to construct school at Boys Industrial School, here, cost $65,000, also remodel building at same institution, $80,000.

O., Shaker Heights—Hospital—Boulevard Hospital & Clinic Co., Osborn Bldg., Cleveland, plans to build 3 story, rein.-con., brick and steel, rein.-con. flooring, concrete and brick foundation, on Shaker Rd. and East Blvd., here. About $250,000. Architects name withheld.

O., Toledo—Church—St. Pauls Lutheran Church having plans prepared by W. C. Corbusier, archt., Lennox Park, Cleveland, for 1 story, brick and stone, rein.-con. flooring, brick and concrete foundation. About $300,000. L. S. Shur, pastor.

O., Orient—Institute—Ohio Bd. Administration, Columbus, plans to construct additional building at Institution for Feeble Minded, here. About $100,000.

Ind., Anderson—Lodge—Masonic Temple Assn. plans to build 3 or 4 story, brick and stone, rein.-con. flooring, on West 10th St. About $200,000. Architect not selected.

Ind., Arcola—School—W. F. Holt, trustee, having plans prepared by Mahurin & Mahurin, archts., 124 West Jefferson St., Ft. Wayne, for 2 story, 95 x 105 ft. brick, rein.-con. flooring. About $80,000.

Ind., Auburn—Hot l and Store—Chamber of Commerce plans to build 4 story, brick, rein.-con. flooring. About $500,000. Architect not selected.

Ind., Aurora — Theater—Palace Theater Co. having plans prepared by Rendigs, Panzer & Martin, archts., 507 Palace Theatre Bldg., Cincinnati, O., for 1 story, 50 x 108 ft. brick and terra cotta, rein.-con. flooring. About $75,000.

Ind., Carmel—School—B. Evans, trustee, having plans prepared by L. Allen, archt., 401 Lombard Bldg., Indianapolis, for 2 story, 95 x 120 ft., brick, rein.-con. flooring. About $160,000.

Ind., Chalmers—School—J. Kassabaum, trustee, having plans prepared by Riedel & Zink, archts., Lafayette, for 2 story, 87 x 114 ft. brick and stone. About $75,000.

Ind., Columbus—Memorial—Comrs. Bartholomew Co. plan to build 2 story, brick and stone, rein.-con. flooring. About $450,000. Architect not selected.

Ind., Crothersville—School—D. E. Bedel, trustee, having plans prepared by C. E. Conway, archt., Seymour, for 2 story, 62 x 75 ft. brick, tile and stone addition, rein.-con. floor g. About $75,000.

Ind., Decatur—Hospital—Comrs. Adams Co. having plans prepared by O. Hoffman, archt., Studebaker Bldg., for 2 story, rein.-con. and brick, rein.-con. flooring. About $85,000.

Ind., Delphi—School—W. A. Smith, trustee, having plans prepared by S. Young, archt., Monticello, for 2 story, brick, rein.-con. flooring. About $75,000.

Ind., Elkhart—School—Bd. Educ. having plans prepared by A. H. Ellwood & Son, archts., Haynes Bldg., for 2 story, brick and stone, rein.-con. flooring. About $150,000.

Ind., Elkhart—School—Bd. Educ. having plans prepared by A. H. Ellwood & Son, archts., Haynes Bldg., for 2 story, 54 x 78 ft. school and power plant addition, brick and stone, rein.-con. flooring. About $75,000.

Ind., Evansville—See. "Industrial Works."

Ind., Evansville — Hospital — Deaconess Hospital having plans prepared for 3 story, 53 x 121 ft., rein.-con. and brick addition, rein.-con. flooring About $200,000. H. E. Boyle & Co., Furniture Bldg., archt.

Ind., Evansville—School—Bd. Educ. having plans prepared by Russ & Karges, archts., Furniture Bldg., for 2 story, brick, rein.-con. flooring, on Baker Ave. About $75,000.

Ind., Ft. Branch—High School—S. R. Lockwood, trustee, having plans prepared by C. Shopbell & Co., archt., Furniture Bldg., Evansville, for 2 story, 78 x 115 ft., brick, rein.-con. flooring. About $110,000.

Ind., Ft. Wayne—Bank—Guarantee Loan & Trust Co. having plans prepared for 2 story, brick, tile and marble, rein.-con. flooring, on West Berry St. About $75,000. Private plans.

Ind., Ft. Wayne — Commercial — A. H. Perfect and B. Dorsey, Ft. Wayne, plan to build 90 x 185 ft. brick, rein.-con. flooring, on Lewis and Harrison Sts. About $125,000. Architect not selected.

Ind., Ft. Wayne—High School—Bd Educ. having plans prepared by C. R. Weatherhogg, archt., Citizens Trust Bldg., for 2 story addition, brick, rein.-con. flooring. About $400,000.

Ind., Ft. Wayne — Hotel — J. Keenan, Hotel Anthony, plans to build brick, rein.-con. flooring, on Harrison and Washington Sts. About $200,000. Architect not selected.

Ind., Franklin — Gymnasium — Bd. Educ. having plans prepared by L. Griffin, archt., Franklin, for 1 story, 85 x 180 ft., brick, rein.-con. flooring. About $75,000.

Ind., Hobert — School — H. W. Swanson, trustee, having plans prepared by C. F. Limbke, archt., 304 North Morgan St., Valparaiso, for 2 story, brick, rein.-con. flooring. About $225,000.

Ind., Indianapolis—Apartment—D. Graham, archt., 1128 Hume-Mansur Bldg., preparing plans for 3 story, brick, terra cotta and tile, on North Meridan St. About $550,000. Owner's name withheld.

Ind., Indianapolis — Armory — State Armory Bd. rejected bids received June 15, building 2 story, 132 x 165 ft. brick, steel and concrete, rein.-con. flooring, on 13th St. and Ashland Ave. About $125,000. Work will be readvertised. Bass, Knowlton & Co., 801 Hume-Mansur Bldg., archts. Noted May 19.

Ind., Indianapolis—Church—Brightwood Methodist Episcopal Church having plans prepared by McGuire & Shook, archts., 320 Ind. Phythian Bldg., for 2 story, brick and stone, on Brightwood Ave. About $75,000.

Ind., Indianapolis—Church—English Lutheran congregation plans to build 1 story, 40 x 74 ft., 30 x 60 ft. and 25 x 30 ft brick, stucco and stone, on East Michigan and Wallace Sts. About $75,000. C. E Bacon, 605 Odd Fellows Bldg., archt.

Ind., Indianapolis — Church and Sunday School—Emerson Ave. Baptist Church having plans prepared by C. E. Bacon, archt., 605 Odd Fellows Bldg., for 1 and 2 story, 60 x 125 ft., brick and stone, on Emerson Ave. and New York St. About $75,000.

Ind., Indianapolis—Park Shelter House—Bd. Park Comrs. plans to build 2 story, 90 x 115 ft., brick and concrete, rein.-con. flooring, on South Shelby St. About $75,000. H. W. Klausmann, city engr.

Ind., Indianapolis — School — Bd. Educ. having plans prepared by H. Fottz, archts., Limcke Annex, for 2 story, brick, rein.-con. flooring, at 1500 East Michigan St. About $93,500.

Ind., Indianapolis — School — Bd. Educ. having plans prepared by Vonnegut, Bohn & Mueller, archts., Ind. Trust Bldg., for 2 story, brick, rein.-con. flooring, on Central Ave. About $200,000.

Ind., Kokomo — Armory — State Armory Bd., c/o Adjutant General Office, Indianapolis, having plans prepared by E. E. Dunlap Co., archts., City Natl. Bank Bldg., for 2 story, 67 x 177 ft., brick and steel, rein-con. flooring, at 615 North Washington St., here. About $75,000.

Ind., Lafayette—University—Purden University plans to build 2 story, 150 x 195 ft., brick and stone, rein.-con. flooring. About $225,000. W. S. Stone, pres. Architect not selected.

Ind., Lafayette — Hospital and Normal School—St. Elizabeths Hospital, 14th and Hartford Sts., having plans prepared by D. X. Murphy & Son, Louisville Trust Bldg., Louisville, Ky., for two 3 story, 85 x 115 ft. brick and tile, rein.-con. flooring. About $225,000.

Ind., Lafayette—Hospital—Indiana State Soldiers Home having plans prepared by Nicol, Scholer & Hoffman, archt., Ross Bldg., for 2 story, brick, rein.-con. flooring. About $175,000.

Ind., Lincoln — School — Township Trustees plan to build 2 story, brick, rein.-con. flooring. About $100,000. Architect not selected.

Ind., Logansport—School—C. D. Marshall, trustee, selected bids building 2 story, 80 x 125 ft., brick. About $75,000. Boswell & Garriott, Masonic Temple Bldg., archts. Noted Jan. 6. Work will be readvertised.

Ind., Michigan—Theater, Store and Office—Michigan City Theater Co. having plans prepared by H. L. Newhouse, archt., 4620 Prairie Ave., Chicago, for 3 story, 60 x 125 ft. brick and terre cotta, rein.-con. flooring, on Franklin St. About $225,000.

Buildings (Continued)

Ind., Michigan City—Hotel and Store—Michigan City Hotel Corp. having plans prepared by Nicol, Scholer & Hoffman, archts., Rose Bldg., Lafayette, for 4 story, 80 x 155 ft. brick and steel, rein.-con. flooring, on Michigan and 7th Sts. About $400,000.

Ind., Michigan City — Church — Polish Roman Catholic Congregation having plans prepared by Wortmann & Steinbach, archts., 155 North Clark St., Chicago, for 1 story, 79 x 150 ft. brick, concrete, tile and stone. About $100,000.

Ind., Mt. Vernon—Lodge—Masonic Temple Assn. having plans prepared by H. E. Boyle & Co., archts., Furniture Bldg., Evansville, for 2 story, brick. About $75,000.

Ind., Muncie—Lodge—Masonic Temple Assn. having plans prepared by C. Kibele, archt., 335 Johnson Blk., for 4 story, 112 x 160 ft., brick, rein.-con. flooring, on Main and Madison Sts. About $400,000.

Ind., Muncie—Science Hall—State Normal School plans to build 2 story, brick, concrete and stone, rein.-con. flooring, on Riverside Ave. About $100,000. Architect not selected.

Ind., New Albany—School—Bd. Educ. having plans prepared by P. Musemiller, archt., 9th and Market Sts., for 2 story, brick, rein.-con. flooring. About $80,000.

Ind., Newcastle—School—D. Hoover, trustee, having plans prepared by C. E. Werking & Son, archt., Palladium Bldg., Richmond, for 2 story, 85 x 121 ft. brick. About $75,000.

Ind., Paoli — Sanitarium — Paoli Lithia Spring Hotel Co. plans to build 2 story, rein.-con. and brick, rein.-con. flooring. About $300,000. C. R. Ayres, 118 North LaSalle St., Chicago, Ill., archt.

Ind., Patoka — School — W. L. Smith, trustee, Hazleton, having revised plans prepared by J. W. Gaddis, archt., Vincennes, for 2 story, 86 x 112 ft. brick and hollow tile, here. About $76,000. Noted March 24.

Ind., Peru—High School—Bd. Educ. having plans prepared by Bass, Knowlton & Co., archts., Hume-Mansur Bldg., Indianapolis, for 2 story, brick, rein.-con. flooring. About $275,000.

Ind., Portland — School — L. C. Holmes, trustee, plans to build 2 story, 75 x 100 ft. brick. About $75,000. O. O. Clayton, Portland, archt.

Ind., Richmond — Hospital — Eastern Indiana Hospital for the Insane plans to build 2 story, brick addition, brick, rein.-con. flooring, at East Haven. About $75,000. Architect not selected.

Ind., Ridgeville—School—A. Collins, trustee, having revised plans prepared by Bass, Knowlton & Co., archts., 801 Hume Mansur Bldg., Indianapolis, for 2 story, 97 x 124 ft., brick, rein.-con. flooring. About $125,000.

Ind., Shelbyville—Lodge—B. P. O. Elks 457, having plans prepared by Kopf & Woolling, archts., Pothian Bldg., Indianapolis, for 2 story, 67 x 102 ft. brick and stone, rein.-con. flooring. About $75,000.

Ind., Shelbyville—High School—H. Burret, trustee, plans to build 2 story, brick. About $75,000. Architect not selected.

Ind., Shoals—High School—Bd. Educ. having plans prepared by L. Allen, archt., Lombard Bldg., Indianapolis, for 2 story, brick addition, rein.-con. flooring. About $75,000.

Ind., South Bend—College—Notre Dame University plans to construct commerce engineering and dormitory buildings, all 2 story, brick and stone, rein.-con. flooring. About $200,000, $300,000 and $450,000 respectively. Architect not selected.

Ind., Thorntown—Church—Presbyterian Church having plans prepared by A. Grindle, archt., Bloomington, for 2 story, 85 x 85 ft. brick church. About $75,000.

Ind., Valparaiso—Theater and Store—G. G. Shauer & Sons Co., Flint Lake Farm, having revised plans prepared by C. F. Limbke, archt., 304 Morgan St., for 2 story, 73 x 132 ft. brick, rein.-con. flooring. About $75,000. Former bids rejected. Noted March 3.

Ind., Versailles—School—W. A. Green, trustee, having plans prepared by H. M. Griffin archt., McFarlan Bldg., Connersville, for 2 story, 25 x 81 ft. and 30 x 31 ft., brick. About $75,000.

Ind., Warsaw—School—Bd. Educ. having revised plans prepared by S. A. Craig & Co., archts, Huntington, for 2 story, 50 x 115 ft. brick school. About $75,000. Former bids rejected. Noted March 24.

Ind., Washington — Hospital — Comrs. Daviess Co. plan to build 2 story, brick addition to hospital. About $75,000.

Ind., Williamsburg—School—E. C. Veal, trustee, rejected bids and having revised plans prepared by C. E. Werking & Son, archts., Richmond, for 2 story, 65 x 100 ft. brick, rein.-con. flooring. About $80,000.

Mich., Marquette — Temple — Masonic Temple Assn. having preliminary plans prepared by Herbst & Kuenzli, archts., 114 Grand Ave., Milwaukee, Wis., for 2 story, concrete, brick, steel and stone, rein.-con. flooring, concrete foundation. About $328,000.

Ill., Bloomington—College—Illinois Wesleyan College c/o T. Kemp, pres., plans to construct college, to include library building, gymnasium, auditorium, dormitory and school buildings. About $700,000. Architect not selected.

Ill., Bloomington — School — Bd. Educ. plans to build 2 story, brick, stone, hollow tile and steel. About $100,000. H. G. Bent, supt. Architect not selected.

Ill., Chicago — High School — Sisters of Charity of Blessed Virgin, c/o F. B. Byrne, archt., 104 South Michigan Ave., have acquired 240 x 500 ft. site on Irving Park Blvd. and Lincoln Park Ave. and plan to build 3 story, rein.-con. and brick, rein.-con. flooring concrete foundation. About $1,000,000. Construction of at least first unit will proceed next spring.

Ill., Chicago—Dance and Assembly Hall—Fantasia Corp., 636 Federal St., having plans prepared by J. S. Aroner & Co., archts., 304 South Wabash Ave., for 3 story, 145 x 155 ft., rein.-con., brick and terra cotta, rein.-con. flooring, concrete foundation, on 64th St. and Cottage Grove Ave. About $750,000.

Ill., Chicago—Store or Apartment—S. Rosen has purchased 83 x 124 ft. site on Sheridan Rd. and Leland Ave. and will improve next year with a 4 story office or 12 story apartment. F. D. Klafter, archt., 64 West Randolph St., preparing preliminary sketches of both, and decision will be made later.

Ill., De Kalb—Theatre and Dance Hall—G. W. Reynolds, Lincoln Highway, plans to build 2 story, brick, rein.-con. and steel. About $100,000. Architect not selected.

Ill., McNabb—School—Bd. Educ. having plans prepared by A. L. Pillsbury, archt., Bloomington, for 2 story, 66 x 100 ft. brick, stone, hollow tile and steel. About $90,000.

Ill., Quincy—Theater and Store—Penkelman & Cony having plans prepared by J. Eberson, archt., 64 East Van Buren St., Chicago, for 2 story, 80 x 160 ft. rein.-con. and brick, rein.-con. flooring, concrete foundation. About $750,000.

Ill., Rockford—Theater and Apartment—C. E. Wolfley, archt., Stewart Bldg., preparing plans for 3 story, 85 x 150 ft., brick, stone and steel. About $150,000. Owner's name withheld.

Ill., Taylorville—Temple—Mound Lodge 122 A. F. and A. M. plans to build 2 story, brick, stone and rein.-con. About $85,000. Architect not selected.

Wis., Laramie—High School—City plans to issue $90,000 bonds to build manual training high school. Architect not selected.

Wis., Milwaukee—Apartment—M. Tullgren & Sons, archts., 425 East Water St., preparing plans for 7 story, 68 x 100 ft. brick and rein.-con., rein.-con. flooring, concrete foundation, on Prospect Ave. About $300,000.

Wis., Milwaukee — Church — Mt. Olive Lutheran congregation, 529 Sherman St., having preliminary plans prepared by Kirchoff & Rose, archts., 221 Grand Ave., for brick, concrete and steel, rein.-con. flooring, concrete foundation, on Washington Blvd. About $125,000. Noted April 21.

Wis., Milwaukee — Club House — South Shore Yacht Club, foot of Nock St., having preliminary plans prepared by C. Shepherd & Clas, archts., 445 Milwaukee St., for 2 story, tile and concrete, rein.-con. flooring, concrete foundation, on Nock St. About $75,000.

Wis., Milwaukee — Temple — Excelsior Lodge No. 175 having preliminary plans prepared by R. E. Oberst, archt., 307 Grand Ave., for 2 story, 98 x 116 ft., concrete, brick and stone, rein.-con. flooring, concrete foundation, on National Ave. About $125,000. G. Waetjen 110 Reed St., secy.

Wis., Sauk City—Church and School—St. Aloysius Catholic Congregation, having plans prepared by J. Dresen, archt., Sauk City, for 2 story, 76 x 156 ft., rein.-con., brick and steel, brick foundation, on Main St. About $75,000. A. Schaunberg, pastor.

Wis., Sheboygan Falls—School—Dist. No. 1 having plans prepared by W. C. Weeks, archt., 720 Ontario Ave., Sheboygan, for 2 story, 96 x 145 ft., rein.-con., brick and tile, brick foundation. About $75,000. E. G. Rochl, clk.

Wis., Stoughton—School and Dormitory—Martin Luther Orphans Home having plans prepared by Sund & Dunham, archts., 512 Essex Bldg., Minneapolis, Minn., for 1 story, 59 x 77 ft. school and 2 story, 45 x 175 ft. dormitory, rein.-con., tile and brick. About $100,000

Ia., Burnside—School—Bd. Educ. having revised plans prepared by W. E. Hulse & Co., archts., Masonic Temple, Des Moines, for 2 story, 56 x 86 ft. rein.-con., brick, stone and steel. About $90,000. Noted May 19.

Ia., Clarinda—High School—City voted $140,000 bonds to build 2 story, rein.-con., brick, tile and stone. H. Stephens, secy. Bd. Educ. Architect not selected. Noted June 9.

Ia., Iowa City—Chemistry—State Bd. of Control, c/o J. M. Foske, supt. State University, here, having plans prepared by Proudfoot, Bird & Rawson, archts., Hubbell Bldg., Des Moines, for 2 story, brick and stone. About $75,000.

Ia., Mason City—School—Bd. Educ. having plans prepared by Proudfoot-Bird & Rawson, archts., Hubbell Bldg., Des Moines, for 2 story, rein.-con., brick and stone. About $75,000. R. L. James, secy.

Ia., Muscatine—Y. W. C. A., c/o A. Owers, 317 East 3rd St., having preliminary sketches made by Shattuck & Layer, archts., 19 South La Salle St., Chicago, for 2 story, 60 x 140 ft. brick and stone building. About $175,000.

Ia., Oskaloosa — Hotel — R. J. Walsh, Davenport, having plans prepared by Clausen & Kruse, archts., Central Bldg., Davenport, for 7 story, 40 x 110 ft. rein.-con., brick, stone and steel, here. About $350,000. Noted June 23.

Ia., Pleasantville—School—Bd. Educ. having plans prepared by F. E. Wetherall, archt., Flynn Bldg., Des Moines, for 2 story. About $75,000. J. K. Keffer, secy. Noted May 19.

Ia., Sioux City—Club—Sioux City Athletic Club plans to build 4 story, rein.-con., brick, stone and tile. About $300,000. R. H. Munger, chn. Architect not selected.

Ia., Treynor—School—Bd. Educ. having plans prepared by A. Anderson, archt., 2526 Ave. D, Council Bluffs, for 2 story, brick and stone. About $75,000. Noted June 9.

Ia., Walcott — School — City defeated $175,000 bonds to build 2 story, 70 x 120 ft. rein.-con., brick, tile and stone. Project indefinitely postponed.

Minn., Ellendale—School—City defeated $75,000 bonds to build 2 story, rein.-con., brick and tile. C. R. Torgerson, clk. Noted June 23.

Minn., Fergus Falls—Theatre—Orpheum Theatre Co., c/o C. F. McCarthy, secy., rejected bids received June 17, and having revised plans prepared by B. D. Keck, archts., First Natl. Bank Bldg., Grand Forks, for 2 story, 50 x 142 ft. rein.-con., brick, stone and tile. About $80,000. Work will be readvertised. Noted March 3.

Minn., Minneapolis — Hotel — Miller & Sherman, 26 Washington Ave. S., having plans prepared by Liebenberg, Kaplan & Martin, archts., 617 McKnight Bldg., for 5 story, rein.-con., brick and tile on 2d Ave. S. and Washington Ave. About $250,000.

Minn., Minneapolis—Sanitorium—Minneapolis Sanitorium Hotel Co., 2200 Kenwood Parkway, having plans prepared by Bertrand & Chamberlain, archts., 616 Northwestern Bank Bldg., for 4 story (ultimately 8 story) rein.-con., brick, tile and stone, on Yale Pl. and Willow St. About $200,000. C. M. Rawitzer, pres.

Buildings (Continued)

Minn., St. Paul—Apartments—M. Fink & Son, 714 Merchants Bank Bldg., having plans prepared by P. J. Linhoff, archt., 906 Guardian Life Bldg., for two 3 story, 46 x 130 ft. rein.-con., brick, stone and tile, on 6th St. and Summit Ave. About $125,000 each.

Minn., St. Paul—School—Bd. Educ. having plans prepared by C. A. Hausler, archt., City Hall, for 2 story, rein.-con., brick and tile, at 712 Laurel Ave. About $250,000.

Kan., Belleville—Hospital—State Methodist Episcopal Hospital Assn., c/o N. E. Davis, 740 Rush St., Chicago, plans to build 2 story, rein.-con., brick and stone, here. About $150,000. Architect not selected.

Kan., Burlington—School—Bd. Educ. having plans prepared by H. B. Winter, archt., Manhattan, for 2 story, 94 x 126 ft., rein.-con. and steel, brick foundation. About $75,000.

Kan., Independence—Convention Hall—City election July 12 to vote on $250,000 bonds to build 2 story convention hall. G. H. Kreinhagen, clk. Architect not selected. Noted May 19.

Neb., Papillion—Court House—Sarpy Co. plans to build court house. About $150,000. J. Dooley, clk. Architect soon to be selected.

N. D., Devils Lake—High School—City voted $325,000 bonds to build 3 story, rein.-con. brick and tile. N. Sauvain, supt. Engineer not announced. Noted June 7.

Mont., Boulder—College—State Bd. Educ., Helena, plans to build college, here. About $200,000.

Mont., Bozeman—Engineering, etc.—State Bd. Educ., Helena, having plans prepared by F. Wilson, archt., Owenhouse Bldg., for engineering building, shops, and heating plant, $250,000, $100,000 and $50,000, respectively; G. H. Shanley, Great Falls, archt., for biology building and gymnasium, $175,000 and $225,000 respectively. Noted Dec. 23.

Mont., Butte—Metallurgical—State Bd. Educ., Helena, having plans prepared by F. Hammill, archt., Columbia Gardens, for metallurgical building, at university, here. About $200,000. Noted Jan. 13.

Mont., Helena—College—State Bd. Educ. plans to build college, here. About $100,000.

Mont., Miles City — Gymnasium — State Bd. Educ., Helena, pans to build gymnasium, here. About $80,000.

Mont., Missoula — Library, etc. — State University of Montana having plans prepared by McIvor & Cohagen, archts., 407 Electric Bldg., Billings, for library, cost $250,000; G. H. Carsley, Power Bldg., Helena, archt., for gymnasium, $225,000; O. Bakke, Gibson Blk., archt. for forestry building; Link & Haire, Helena, archts. for women's and men's dormitory, $125,000 and $100,000 respectively.

Mont., Missoula—Library, etc.—State Bd. Educ., Helena, having plans prepared by McIyor & Cohagen, archts., 407 Electric Bldg., Billings, for library, cost $250,000; Bakke & Forbes, Missoula, archts. for heating plant, $50,000; G. H. Carsley, Helena, archt. for gymnasium, $225,000; O. Bakke, Bibson Bldg., archt. for forestry building, $100,000; Link & Haire, 317 Electric Bldg., Billings, archts. for women's dormitory and men's dormitory, $125,000 and $100,000 respectively.

Mont., Shelby—Hotel—E. Mallett plans to build 3 or 4 story, rein.-con., brick and tile. About $80,000. Architect not announced.

Mo., Carthage — Church — First Baptist Church, c/o R. T. Stickney, chn., having plans prepared by J. E. Green, archt., Birmingham, Ala., for 2 story, brick and stone. About $75,000.

Mo., Excelsior Springs—Church—Christian Church having plans prepared by J. H. Felt & Co., archts., Grand Ave. Temple, Kansas City, for 1 story, 60 x 90 ft., brick, semi-fireproof construction, brick foundation. About $75,000.

Mo., Monett — Hotel — Monett Hotel & Theatre Co., c/o A. E. Morelock, pres., St. Louis, having plans prepared by N. B. Howard, archt., Arcade Bldg., St. Louis, for 5 story, brick, stone and concrete, on Front and 5th Sts., here. About $200,000.

Mo., St. Louis — Bank — Imperial Trust Co., c/o H. C. Brenner, 2800 Chippewa St., having plans prepared for 2 story, brick, stone, rein.-con. and steel, on California and Chippewa Sts. About $75,000. Private plans.

Mo., St. Louis—College—Christian Bros. College, c/o A. Baldwin, pres., having plans prepared by H. P. Hess, archt., 4811 Cote Brilliant Ave., for 3 story, 172 x 248 ft. rein.-con. and brick, on Clayton Rd. and University Lane. About $500,000.

Mo., St. Louis—Theatre—Aubert Photo Play Co., c/o J. H. Drucker, Title Guarantee Bldg., plans to build brick, stone or terra cotta, trim, on Aubert and Easton Sts. About $250,000. Architect not selected.

Mo., Sikeston—Temple—A. F. & A. M. Lodge plans to build 2 story, brick and stone. About $85,000. Architect not selected.

Kan., Topeka — Library — City plans to build brick and stone. About $300,000. E. Covell, clk. Architect not selected.

Kan., Nedesha—High School—Bd. Educ. plans to build 3 story, brick, concrete and steel. About $125,000. A. K. Roppert, secy. Architect not selected.

Okla., El Reno—High School—Bd. Educ. having preliminary plans prepared by Layton, Smith & Forsyth, archts., 701 Majestic Bldg., Oklahoma City, for 3 story, brick, stone, rein.-con. and steel. About $214,000. Noted June 9.

Okla., Muskogee—Auditorium and Armory—City plans election to vote on $150,000 bonds to build auditorium and armory. Architect not selected.

Okla., Norman—Church—Methodist Episcopal Congregation having plans prepared by Hawk & Parr, archts., Colcord Bldg., Oklahoma City, for 2 story, brick and stone. About $150,000.

Okla., Oklahoma City—Apartment—C. G. Prale, Freeport, Ill., having plans prepared by G. A. Nichols, archt., S.W. Natl. Bank Bldg., for 3 story, 48 x 88 ft., brick and stone, on 11th and Classen Sts. About $75,000.

Okla., Okmulgee — Church — Methodist Episcopal Church having plans prepared by Bass, Knowlton & Graham, archts., 603 Kennedy Bldg., Tulsa, for 2 story, 100 x 140 ft., brick and stone. About $150,000.

Okla., Owasso—High School—Bd. Educ. having plans prepared by Mounott & Reid, archts., Empire Bldg., Oklahoma City, for 2 story, 64 x 116 ft., brick, concrete and stone. About $75,000.

Okla., Tulsa — Theatre — A. S. Sinclair having plans prepared by F. A. Duggan, archt., 202 Seamon Bldg., for theatre on 8th and Main Sts. About $150,000.

Colo., Arapahoe—School—Bd. Educ. having plans prepared by H. B. Winter, archt., Manhattan, Kan., for 2 story, 78 x 130 ft., rein.-con. and steel, brick foundation. About $75,000.

Col., Grand Junction — Theatre — First Natl. Exch. Circuit, 1732 Welton St., Denver, plans to build theatre here. About $75,000. Architect not selected.

Utah—Salt Lake City — Temple — Salt Lake Masons, Wilson Hotel, plan to build temple, at 644 East South Temple St. About $750,000. F. C. Schramm, archt., 1414 Perry Ave., has preliminary plans in charge. Architect not selected.

Wash., Aberdeen — Armory—M. Thompson, adj. genl., c/o Seattle Armory, receives bids about July 15, building 2 story, 75 x 150 ft. concrete and tile, on 1st and 3rd Sts., here, for Washington Natl. Guard Olympia. About $100,000. L. Swarz, Natl. Bank Bldg., Seattle, archt.

Wash., Seattle—Office and Store—Metropolitan Bldg. Co., Henry Bldg., having plans prepared by Howells & Albertson, archts., Henry Bldg., for 5 story, 75 x 100 ft. concrete and steel, on 4th and Union Sts. About $200,000.

Cal., San Diego—High School—Bd. Educ. having plans prepared by T. C. Kistner, archt., Central Mtge. Bldg., for high school, in Balboa Park. About $300,000.

Cal., Long Beach—Hotel—H. F. Beier, c/o W. H. Austin, archt., 1st Natl. Bank Bldg., having plans prepared for 3 story, brick, on Cedar Ave. About $100,000.

Cal., Los Angeles—School—Bd. Educ., Security Bldg., having plans prepared by Train & Williams, archts., 226 West Mutual Life Bldg., for 2 story, 10 room, brick, on McKinley Ave. About $240,000.

Cal., Los Angeles—School—Bd. Educ. having plans prepared by Edelman & Barnett, archts., H. W. Hellman Bldg., for 10 room addition to school at 817 West 52nd St. About $80,000.

Cal., Los Angeles—School—Bd. Educ., Security Bldg., having plans prepared by Noerenberg & Johnson, archts., Los Angeles Ry. Bldg., for 2 story, 81 x 142 ft. brick, concrete foundation, at 2208 East 3rd St. About $90,000.

Que., St. Jean Chrysostome—Church—A. Emard, bishop, Valleyfield, plans to build 50 x 110 ft. brick and stone, concrete foundation, on Notre Dame St., here. About $300,000. Architect not selected.

Ont., Mimico—School—Bd. Educ. having plans prepared by H. R. Watson, archt., 36 Toronto St., Toronto, for 2 story, 12 room, concrete, brick and steel, concrete foundation. About $120,000.

Ont., Mount Dennis—School—School Bd. Sect. 28 having plans prepared by S. B. Coon & Son, archts., 4 St. Thomas St., Toronto, and receives bids about June 15, building 2 story, 6 room, concrete, brick and steel, concrete foundation. About $90,000.

Ont., St. Catharines — Collegiate — Bd. Educ., 11 Welland Ave., having plans prepared by S. B. Coon & Son, archts., 4 St. Thomas St., Toronto, for 2 story, 18 room, rein.-con., brick and steel, rein.-con. flooring, concrete foundation, on Catharine and Maple Sts. About $350,000. C. A. McBride, 13 Welland Ave., secy.-treas.

Ont., Strafford—School—School Bd. having plans prepared by H. G. Holman, archt., Beacon Bldg., for 2 story, 6 room, on Downie St. About $100,000. Prices wanted on all materials.

Ont., Toronto—Office—General Accident Assurance Co. of Canada, Ltd., Continental Life Bldg., plans to build 8 or 10 story, rein.-con., brick and steel, rein.-con. flooring, concrete foundation, on Bay and Temperance Sts. About $300,000.

BIDS DESIRED

Mass., Belchertown — Dormitory —Until July 1, by M. Kline, dir. Com. Mental Diseases, 109 East State House, Boston, building 2 story, brick and steel custodial building, 3 story, brick and steel dormitory and two frame cottages, at State Colony Group Hospital, here. About $300,000. Kendall, Taylor & Co., 142 Berkeley St., Boston, archts.

Mass., Brighton (Boston P. O.)—Theatre—Until July 6, by Mowll & Rand, archts., 50 Bromfield St., Boston, building 1 story, 106, 267 ft. brick, steel and concrete, on Commonwealth Ave. and Gorham St., for Olympia Theatres, Inc. About $200,000.

Mass., Longmeadow—Community—J. P. Harding, chn. Town Community Bldg. Com., receiving bids constructing 2 story, 62 x 130 ft. and 30 x 40 ft., brick and steel, concrete foundation, on Longmeadow St. About $150,000. Smith & Bassette, 36 Pearl St., Hartford, Conn., archts.

Mass., Worcester — College — Holy Cross College, College St., receiving bids building 4 story, 33 x 102 ft. with two 53 x 93 ft. wings, brick and stone, concrete foundation. About $300,000. Maginnis & Walsh, 100 Boylston St., Boston, archts.

R. I., Providence—School and Hall—St. Pauls Roman Catholic Church, Broad St., receiving bids building 2 story, 100 x 110 ft. brick and steel, rein-con. flooring, concrete foundation. About $135,000. M. McCabe, pastor. A. J. Murphy, Westminster St., archt.

Conn., Manchester—Club and Lodge—Knights of Columbus, Council 573 receiving bids building 2 story, 60 x 90 ft. brick, concrete and steel, rein.-con. flooring, concrete foundation, on Main and Bissell Sts. About $75,000. A. E. Fiske, 709 Main St., archt. Noted March 3.

Conn., Meriden—Business—E. Derecktor, 39 Crown St., receiving bids building 4 story, brick, concrete and steel addition, rein.-con. flooring, on West Main St. About $150,000. D. Bloomfield, 52 Sherman Ave., archt. Noted June 16.

Conn., Norwich—School—Until July 5, by R. P. Bishop, chn. Bd. School Comrs., building 2 story, 75 x 128 ft. brick, concrete and steel, rein.-con. flooring, concrete foundation, on West St. About $200,000. W. T. Towner, 152 West 42nd St., New York City, archt. Noted April 21.

Conn., Windham Center (Windham P. O.) —School and Hall—School Comn. receiving bids building 2 story, 60 x 70 ft. brick and

Buildings (Continued)

steel, concrete foundation. About $75,000. A. R. Sharpe, 125 Chestnut St., Willimantic, archt. Noted June 23.

N. Y., Elmhurst (Flushing P. O.)—School and Convent—B. Wozny, acht., 94 State St., Springfield, Mass., receiving bids building 2½ story, 70 x 95 ft., brick and stone, rock foundation, on Division Ave., here, for St. Adleberts Roman Catholic Church, Cater Pl. About $75,000. Noted March 31.

Pa., Johnstown—Until July 11, by C. H. Meyer, secy. School Dist. building Maple Park School, Coopersdale School, Washington School No. 2 and Chestnut St. School, all 2 story, about 75 x 100 ft. About $500,000. J. E. Adams, Nemo Bldg., archt.

Pa., Milton—High School—Until July 11, by Bd. Educ. building 3 story, 80 x 100 ft. About $150,000. L. Mundy, secy. R. R. Markley, Spooner Bldg., Harrisburg, archt.

N. C., Morgantown—High School—Until July 5, by Bd. Trustees, building 2 story, stucco and tile, rein.-con. flooring. J. A. Claywell, chn. W. E. Boyer, Jr., 505 Trust Bldg., Charlotte, archt. Noted June 23.

Ky., Wickliffe—High School—Until July 5, by Bd Educ., building 2 story, brick, concrete and steel. About $75,000. P. A. Jones, pres. A. F. Lindsay, McCoy & Tanner Bldg., Sikeston, Mo., archts.

O., Chatfield—School—Until July 5, by Bd. Educ. building 2 story, brick, concrete and steel addition. About $150,000. N. Geiger, clk. W. Unger, Bucyrus, archt.

O., Mansfield—Schools—Until July 19, by Bd. Educ. building 2 story, 6 room addition to West 1st School and 2 story, 4 room addition to Prospect School, both brick, steel and concrete, rein.-con. flooring, brick and concrete foundations. J. H. Bristor, clk. V. Redding, Mansfield, archt.

O., Middletown—Hotel—Until July 12, by Middletown Hotel Co., Main St., building 6 story, 130 x 168 ft., brick, concrete and steel, rein.-con. flooring, brick foundation. About $300,000. F. L. Packard, Hayden Bldg., Columbus, archt. Noted April 21.

O., Warren—Commercial and Theatre—Robins Enterprise Corp. receiving bids building 2 story, 75 x 198 ft., brick, concrete and steel, rein.-con. flooring, brick and concrete foundation, on Market St. About $200,000. C. H. Crane, Huron Bldg., Detroit, Mich., archt.

Ind., Bloomington—School and Church—St. Charles Catholic Church receiving bids building 2 story, 78 x 115 ft. brick and stone, rein.-con. flooring. About $75,000. Erwin, Kopf & Wooling, 402 Pythian Bldg., Indianapolis, archts. Noted May 5.

Ind., Lincoln—School—Until July 14, by C. A. Fawcett, trustee, building 2 story, 85 x 110 ft. brick, rein.-con. flooring. About $100,000. S. Young, Monticello, archt.

Ind., Richmond—School—Until July 15, by W. J. Curtis, trustee, building 2 story, 78 x 105 ft., brick, rein.-con. flooring. About $75,000. C. E. Werking & Son, Palladium Bldg., archt.

Ind., St. Paul—Grade School—Until July 14, by C. D. Marshall, trustee, building 2 story, 85 x 110 ft., brick, rein.-con. flooring. About $75,000. Boswell & Garriott, Logansport, archts.

Mich., Channing—High School—Until July 2, by Bd. Educ., building 2 story, 80 x 134 ft., concrete and brick, rein.-con. flooring, concrete foundation. About $96,000. F. E. Parmelee & Son, Iron Mountain, archt.

Mich., Wyandotte — High School — Until July 6, by E. Haas, secy. Bd. Educ., building 3 story, rein.-con., brick and steel, rein.-con. flooring, concrete foundation, on Eureka and 5th Sts. About $500,000. B. C. Wetzel & Co., 2317 Dime Bank Bldg., Detroit, archts.

Ill., Arlington—School—Until July 5, by Bd. Educ. and W. G. Foster, archt., Streator, building 2 story, 56 x 79 ft., brick, stone, rein.-con. and steel. About $75,000.

Ill., Chicago—Sales—D. S. Klafter, archt., 64 West Randolph St., receiving bids building 1 story, 70 x 125 ft. mill construction sales and service station, concrete foundation, on Bway. and Berwyn Ave., for M. H. Spades, c/o architect. About $80,000.

Wis., Appleton—Office—Until July 11, by Lutheran Aid Assn., 1st Natl. Bank Bldg., constructing 5 and 1 story, 67 x 145 ft. and 25 x 70 ft. rein.-con. and brick, rein.-con. flooring, concrete foundation. About $80,000. Parkinson & Dockendorff, Linker Bldg., La Crosse, archts. Noted May 19.

Wis., Superior—Hotel—Until Aug. 1, by Lake Superior Hotel Co., Tower and Belknap Aves., remodeling 1 story, 140 x 200 ft. brick and steel, concrete foundation, on Tower Ave. About $200,000. J. O. Bach, 1111 Tower Ave., archt. and engr.

Ia., Barnum—School—Until July 19, by Bd. Educ., building 2 story, 60 x 115 ft. brick, rein.-con. flooring, concrete foundation. About $85,000. Damon, O'Mara & Hillis, 19 East Mason Bldg., Ft. Dodge, archts.

Ia., Nodaway — School — Until July 12, (change of date) by S. J. Means, secy. School Bd., building 2 story, 65 x 100 ft. rein.-con., tile and brick rein.-con. flooring, concrete foundation. About $80,000. Keffer & Jones, 204 Masonic Temple, Des Moines, archts. Noted June 23.

Ia., Sutherland—School—Until July 6, by E. C. Briggs, secy. School Bd., building 3 story, 60 x 140 ft. rein.-con., brick, tile and Bedford stone, rein.-con. flooring, concrete foundation. About $125,000. Keffer & Jones, 204 Masonic Temple, Des Moines, archts.

Ia., Sioux City—Temple—Until July 20, by Beuttler & Arnold, archts., Grain Exch. Bldg., constructing 3 story, 150 x 150 ft. rein.-con., brick, tile and stone, on 9th and Nebraska Sts., for Masonic Assn., York Rite. About $300,000. A. O. Wakefield, Iowa Bldg., Sioux City, secy. Noted Oct. 7.

Ia., Waterville—High School—A. Asleson, secy. Bd. Educ. and C. F. Saam, archt., 4th and Main Sts., Dubuque, receiving bids building 2 story, 64 x 82 ft. brick and steel. About $85,000.

Minn., Duluth—School—Until July 18, by C. A. Bronson, secy. Bd. Educ., building 2 story, 63 x 114 ft. rein.-con., brick and steel, rein.-con. flooring, concrete foundation, in Riverside Park. About $120,000. Kelly & Shefehik, 407 Lonsdale Bldg., archts.

Kan., Arkansas City—High School—Until July 6, by Bd. Educ., building 2 story, brick, stone, concrete and steel. About $250,000. C. E. St. John, supt. F. W. Williamson & Co., Central Natl. Bank, Topeka, archts.

Neb., Brule—School—Until July 7, by Bd. Educ., building 2 story, 56 x 78 ft., rein.-con. and steel, rein.-con. flooring, brick foundation. About $75,000. Wilson & Wilson, Commonwealth Bldg., Denver, Col., archts.

Neb., Osceola—Court House—Until July 6, by Comrs. Polk Co., building 3 story, 64 x 98 ft., rein.-con., brick and stone. About $125,000. O. F. Branting, chn. W. F. Gernandt, Keeline Bldg., Omaha, archt.

S. D., Rapid City—Hospital—Until July 12, by Methodist Deaconess Hospital Assn., building 2 story, 57 x 89 ft. rein.-con., brick, tile and stone addition to hospital. About $75,000. J. C. Chapman, 313 Paulton Bldg., Sioux Falls, archt.

Mont., Lewistown — High School — Until July 9, by Bd. Educ., building 2 story, rein.-con., brick, tile and stone. About $200,000. A. A. Franzke, supt. Link & Haire, Power Blk., Helena, engrs. Noted Dec. 30, 1920.

Tex., College Station—School—Until July 15, by Bd. Dirs. A. & M. College, constructing argicultural building and engineering shop. About $250,000 and $150,000 respectively. Private plans.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

Mass., Boston—Municipal—City received bids June 23 building 4 story, 105 x 125 ft. brick, on Shawmut Ave., from M. Seretto, 3 Tremont Row, $360,000; F. G. Coburn, Old South Bdg., $391,000; C. S. Cunningham & Son, 80 Boylston St., $398,700.

★**Mass., Brighton** (Boston P. O.)—Church and Parish House — Brighton Congregational Church, 400 Washington St., let contract building 1 story, brick, stone and steel, on Washington St., to C. S. Allen Co., Allston. About $100,000. Noted Feb. 17.

★**Mass., Housatonic**—Town of Great Barrington let contract paving ¾ mi. Park St., concrete, here, to Meneguale & D'Angelo, Goodrich St., Stockbridge. About $25,000.

Mass., North Woburn (Woburn P. O.)—School—Bd. School Comrs. received bids June 14, building 2 story, brick and steel, rein.-con. flooring, concrete foundation in Rumford Dist., from C. S. Cunningham & Sons Co., 80 Boylston St., Boston, $127,800 and $129,300; S. L. Milton, 80 Boylston St., Boston, $127,956 and $129,206; Walsh Bros. Co., Cambridge, $128,814 and $130,514. Noted June 16.

★**Mass., Springfield** — Business — Bowles Bldg. Trustees, 292 Main St., will alter 3 and 5 story, brick, steel and concrete, on Main St. About $100,000. Work will be done by day labor. H. L. Sprague, 310 Main St., archt. Noted June 9.

★**Mass., Springfield** — Business—Wells & White, 739 Worthington St., will build 4 story, brick and steel, concrete foundation, on Dwight and New Sts. About $80,000. Work will be done by day labor. Noted May 5.

★**Mass., Whitinsville**—Lodge and Office—Knights of Pythias let contract building 3 story, brick stone and steel, rein.-con. flooring, concrete foundation, on Church St., to J. M. Darling Co., Inc., 56 North Main St., Fall River. About $100,000. Noted May 2.

Mass., Woburn — School — City received bids building 1 story, 100 x 100 ft. brick, on Elm St., from C. S. Cunningham & Sons Co., 80 Boylston St., Boston, $127,800; S. L. Milton, 80 Boylston St., Boston, $127,956; Walsh Bros. Cambridge, $128,814.

★**R. I., Providence**—Theatre and Office—Bway. Theatre Corp., 87 Weybosset St., let contract building 4 story, rein-con., brick and steel, rein-con. flooring, concrete foundation, on Bway., to H. I. Mathewson, Cranston St. About $250,000. Noted April 7.

★**Conn., New Britain**—Apartment—R. W. Erwin, Elm Hill, Newington, will build 4 story, 50 x 86 ft. brick and steel, concrete foundation, on East Main and North Sts., here. About $75,000. Work will be done by day labor. G. A. Zunner, 182 High St., Hartford, archt. Noted June 16.

★**Conn., New Haven** — Home — Jewish Home for Aged, 169 Davenport Ave., let contract building 3 story, 45 x 55 ft. brick, steel and rein.-con. addition, rein.-con. flooring, on Davenport Ave. and Asylum St. About $75,000.

★**Conn., New Haven**—Hospital—New Haven Hospital, 330 Cedar St., let contract building 1, 2, 3 and 4 story, brick, steel and concrete additions, rein.-con flooring, concrete foundations, including nurses' home, children's ward, service building, etc., to Sperry & Treat Co., 39 Church St. About $1,000,000. Noted June 9.

★**N. Y., Brooklyn** — Apartment — T. H. Bldg. Co., 231 Livonia St., will build 4 story, brick, steel and stone, concrete foundation, on Barrett St. near Blake Ave. About $75,000. Work will be done by day labor. Cohn Bros., 361 Stone Ave., archts. and engrs.

★**N. Y., Brooklyn**—Apartment—Hampton Bldg. Co., 350 Fulton St., will build 4 story, 80 x 80 ft., brick, steel and stone, concrete foundation, on Eastern Parkway near Franklin Ave. About $125,000. Work will be done by day labor. Slee & Bryson, 154 Montague St., archt. and engr.

★**N. Y., Brooklyn**—Apartment—J. Horowitz, 92 Prospect Park West, will build 6 story, 100 x 150 ft., brick, steel and stone, concrete foundation, on St. Johns Pl. near Underhill Ave. About $500,000. Work will be done by day labor. McCarthy & Kelly, 16 Court St., archts. and engrs.

★**N. Y., Brooklyn**—Apartment—J. Katz, c/o Cohn Bros., archts. and engrs., 361 Stone Ave., will build 4 story, 85 x 100 ft., brick, steel and stone, concrete foundation, on 13th Ave. About $150,000. Work will be done by day labor.

★**N. Y., Brooklyn**—School—Bd. Educ., 500 Park Ave., New York City, let contract building P. S. 15, on East 92nd St., Canarsie, to T. A. Clarke Co., 122 Livingston St., $273,300. Noted June 23.

★**N. Y., Long Island City**—Nurses Home—St. Johns Long Island City Hospital, Jackson Ave. and 12th St., let contract building 4 story, 75 x 100 ft., brick, steel and stone, concrete foundation, to J. T. Woodruff & Sons, Bridge Plaza. About $200,000.

★**N. Y., New York**—Home—Institution of Mercy, c/o Lawler & Haase, archts. and engrs., 15 West 38th St., let contract building 5 story, 135 x 200 ft. brick and stone, concrete foundation, on Grand Concourse and 199th St., to G. H. McEntee & Co., Inc., 103 Park Ave. About $250,000. Noted May 5.

Buildings (Continued)

★**N. Y., New York**—Hospital—Beth Israel Hospital Assn., Inc., 30 East 33rd St., let contract building brick, steel and stone, concrete foundation, at 10-18 Livingston Pl., to G. R. Davis, 30 East 42nd St. About $2,500,000.

★**N. Y., New York**—Office—Christ Church Corp., c/o G. F. Pelham, archt. and engr., 200 West 72nd St., let contract building 8 story, brick, steel and stone, concrete foundation, on Bway. and 71st St., to J. J. Hearn & Co., 1036 6th Ave. About $150,000. Noted June 16.

★**N. Y., New York**—Theatre and Office—J. J. Finerty, c/o G. M. McCabe, archt. and engr., 96 5th Ave., let contract building 2 story, 185 x 200 ft., brick, steel and stone, concrete foundation, on Lenox Ave. and 142nd St., to J. S. Hyers Co., Inc., 13 West 40th St. About $250,000. Noted May 19.

★**N. J., Trenton** — Office — State House Comn., State House, let general contract building 3 story, on West Hanover St., to Standard Constr. Co., 315 Cooper St., Phila., $164,750; plumbing and heating to W. G. Royer, 167 Rosemont Ave., $5,400, and $17,507 respectively; electrical work, to Carr & Schultz, Perry and Stockton Sts., $5,488. Noted June 9.

★**Fla., Miami**—Bank—First Natl. Bank, 239 12th St., let contract building 10 story, 75 x 100 ft. steel and brick, to G. A. Fuller Co., 175 5th Ave., New York City. About $500,000. Noted May 12.

★**O., Twinsburg**—School—Bd. Educ. let contract building 2 story, 96 x 103 ft., brick, steel and concrete, rein.-con. flooring, brick and concrete foundation, to A. W. Morette Co., State Bank Bldg., Akron. About $93,900. Noted May 12.

O., Xenia—High Schools—J. R. Beacham, clk. Bd. Educ. received bids June 18, building (1) East High School, 2 story, 128 x 250 ft., on Church St., (2) Lincoln School, 2 story, 117 x 120 ft., on Market St., both brick and concrete, from Kilpatrick & Dawson, Pittsburgh, (1) $274,000; Industrial Bldg. Co., 757-8 Reibold Bldg., Dayton, (1) $281,600, (2) $113,800; Willing Bros., Bellevue, (2) $113,405. Noted June 9.

★**Mich., Ironwood** — Temple — Masonic Lodge will build 3 story, 80 x 120 ft. concrete and brick, rein.-con. flooring, concrete foundation, on Aurora St. About $100,000. Work will be done by day labor. N. A. Nelson, Ironwood, archt.

★**Ill., Chicago**—Theatre and Office—Commodore Amusement Co., 3036 Irving Park Blvd., let masonry contract building 3 story, 81 x 125 ft. rein.-con. and brick, rein.-con. flooring, concrete foundation, at 3101 Irving Park Blvd. About $225,000.

★**Ill., Hoopston**—Theatre—R. J. Boorde let contract building 2 story, 50 x 135 ft. brick, terra cotta and steel, to W. A. Johnson, Hoopston. About $75,000.

★**Ill., Rockford**—School—Bd. Educ. let contract building Kishwaukee School, 2 story, brick and stone, to Security Bldg. Co., Swedish-Amer. Bank Bldg., $186,785. Noted June 9.

★**Ill., Rockford**—High School—Bd. Educ. let contract building 4 story, 51 x 90 ft. school, to Holmquist & Peterson, 809 East State St., $89,634.

★**Wis., Kenosha** — Theater and Office — Orpheum Theater Co., 160 5th St., Milwaukee, let contract building 4 story, brick, concrete and steel, rein.-con. flooring, concrete foundation, on Main St., to Immel Constr. Co., 200 North Main St., Fond du Lac. About $250,000.

★**Wis., Manitowac**—Church and Rectory—St. Pauls Catholic Congregation, 1110 South Main St., let contract building 40 x 120 ft. and 32 x 35 ft., stone and concrete, rein.-con. flooring, concrete foundation, to J. Scheurell, 1115 Marshall St., and J. N. Brachman, 1214 Marshall St. About $75,000. Noted May 19.

★**Wis., Milwaukee**—Continuation School—Bd. Industrial Educ., 7th and Prairie Sts., let contract for rein.-con. work on 7 story, rein.-con. and brick, (2nd unit of continuation school), on 6th and Prairie Sts., to Dahlman Constr. Co., 456 Bway., $159,410; steel, to Milwaukee Structural Co., 19th and St. Paul Sts., $10,000.

★**Ia., Estherville** — Store — H. Oransky, Cedar Rapids, let contract building 2 story, 45 x 118 ft. rein.-con., brick, stone and steel, to Loomis Bros., 319 South 3d St., Cedar Rapids. About $80,000.

★**Ia., Mason City**—School Bd. Educ. let general contract building 2 story, 70 x 120 ft. brick and tile addition to McKinley School, to Beck Eng. Constr. Co., 1137 Plymouth Bldg., Minneapolis. About $64,000.

★**Ia., Waterloo**—First Presbyterian Congregation, c/o J. Graham, let contract building 1 story, 145 x 150 ft. brick, stone and steel, on Franklin and Park Aves., to H. A. Maine Co., 305 Marsh Pl., $178,394.

Minn., Minneapolis—Bathhouse—City will build 2 story, 68 x 84 ft. brick, concrete and stone, on 22d Ave. N. E. About $100,000. Work will be done by day labor. Forsell & Lindell, 319 Meyers Arcade, archts. Noted Jan. 27.

★**Minn., Minneapolis**—Store—Atwood & Co., 123 North 7th St., let contract building 4 story, 50 x 100 ft., rein.-con., brick and tile, on 12th St. and 1st. Ave. N., to C. W. Lundquist Co., 715 15th Ave. About $175,000.

★**Minn., St. Paul**—Theatre—J. Friedman, 141 Endicott Bldg., will build 4 story, 50 x 125 ft. rein.-con., brick and tile, in Wabasha St. between 7th and 8th Sts. About $150,000. Work will be done by day labor. Toltz, King & Day, 1410 Pioneer Bldg., archts. Noted April 14.

★**Kan., Kansas City**—School—Bd. Educ. will build 2 story, 24 x 75 ft. brick, rein.-con. and hollow tile, on 25th and Garfield Sts. About $125,000. Work will be done by day labor.

★**Kan., Wichita**—School—Bd. Educ. let contract building 2 story, concrete and steel, on 9th and Main Sts., to Duncan-Lynch Constr. Co., 4th Natl. Bank, $93,760. Noted June 2.

★**Kan., Wichita**—Theatre and Store—Palace Theatre, 311 East Douglas St., let contract building flooring and retaining walls for 3 story, 140 x 150 ft. concrete, brick, steel and terra cotta, concrete fondation, on Lawrence Ave., to Siedhof Co., Wichita. Total cost, $600,000. Noted May 12.

★**Neb., Norfolk** — Kitchen — State Bd. Control, Lincoln, let contract building 2 story, 55 x 113 ft., brick, stone and concrete, to C. C. Bickel, University Pl. About $75,000.

★**S. D. Aberdeen**—C. F. Hauge, secy. Y. M. C. A., let general contract constructing 3 story, rein.-con., brick, tile and stone building to S. W. Jonason Co., Aberdeen, $161,788. Noted May 19.

★**Okla., Enid**—Church—Roman Catholic Church let contract building 1 story, 52 x 128 ft., brick and stone to Weller & Reardon, 232 Beck Bldg., $75,085. Noted April 14.

★**Cal., Los Angeles**—Store—California Hardware Co., 500 East 1st St., let contract building 4 story, 60 x 140 ft., brick, concrete foundation, at 514 East 1st St., to R. E. Millsap, Marsh-Strong Bldg., $77,415.

Federal Government Work

PROPOSED WORK

Mass., South Boston (Boston P. O.) — Road—Spec. 4477—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to construct road to dry dock, here.

D. C., Wash.—Dispensary—Spec. 4486—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to construct, here. About $75,000.

Cal., Mare Island—Steam Cranes—Spec. 4478—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to construct two 50 ton steam cranes for dry dock, at Puget Sound. About $320,000.

Cal., San Diego — Dredging and Filling, etc.—Spec. 4485—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to dredge, fill and repair base, here.

Cal., San Diego—Quay Wall Extension—Spec. 4484—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to construct, here. About $106,000.

BIDS DESIRED

Ky., Dawson Springs — Buildings — Until July 11, by Treas. Dept., Wash., D. C., constructing 13 buildings at Public Health Sanatorium, here.

Ky., Dawson Springs—Mechanical Equipment — Until July 11, by Treas. Dept., Wash., D. C., installing mechanical equipment in Public Health Sanatorium, here.

Ky., Dawson Springs—Sanatorium—Until July 13, by Treas. Dept., Wash., D. C., constructing 13 buildings at Public Health Service Sanatorium, here. J. A. Wetmore, acting superv. archt.

Ky., Dawson Springs—Sub-Station—Until July 11, by Treas. Dept., Wash., D. C., constructing electric outdoor sub-station at Public Health Service Sanatorium, here. J. A. Wetmore, acting superv. archt.

Mich., Pontiac—Mailing Vestibule—Until July 12, by Treas. Dept., Wash., D. C., constructing in Post Office, here. J. A. Wetmore, acting superv. archt.

Kan., Leavenworth—Shop—Until July 5, by U. S. Government, building 1 story, 250 x 1,000 ft. brick, stone and rein.-con. shop, here. About $500,000. Address Col. E. Taylor, Leavenworth.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**N. H., Portsmouth**—Barracks Repairs—Spec. 4481—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing repairs to New Marine barracks, here, to W. A. Parslow, 105 Melbourne St., $5,725 (30 days).

★**Mass., Chelsea**—Gasoline Storage Building—Spec. 4437—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing at Naval Hospital, here, to M. Seretto, 3 Tremont Row, Boston, Mass., $1,385 (30 days). Noted June 9.

N. Y., New York—Dump Scow—Spec. 4474—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids constructing at Navy Yard, here, (1) work complete, from Phoenix Constr. Co., 41 Park Row, New York City, (1) $20,897 (60 days) (2) add $40 deduct $20 (3) add $0.050 deduct $0.25 (4) add $1,553 (5) deduct $50; Robbins Ripply Co., 50 Church St., New York City, (1) $26,355 (60 days) (2) add $30 deduct $25 (3) add $1 deduct $0.20 (4) add $2,510 (15 days) (5) deduct $100; Jarrett & Chambers, 30 East 42nd St., New York City, (1) $33,500 (60 days) (2) $2,850 (3) $0.35 (4) add $815 (5) $126.

N. Y., Brooklyn—Roads and Sidewalks—Spec. 4468—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 22 constructing concrete roads and sidewalks, here, (1) work complete, from H. S. Roberts, 151 East 38th St., New York City (1) $9,900 (45 days) (2) add $2.50 deduct $1.50; F. G. Fearon, 280 Madison Ave., New York City, (1) $15,600 (45 days) (2) add $6 deduct $3; Estate of J. Bauer, 38 Wallabout St., (1) $17,344 (45 days) (2) add $6 deduct $2. Noted June 16.

★**N. J., Lakehurst**—Automatic Telephone System — Spec. 4452 — Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing, at Naval Air Sta., here, to Geo. Constr. Co., Inc., 407 Stock Exchange Bldg., Phila., Pa., $16,130 (70 days). Noted June 23.

★**Pa., Phila.** — Canvas — U. S. Engineer, War Dept., let contract furnishing canvas for rubber dredging sleeves, here, to Mt. Vernon Woodbury Mills, Inc., Continental Bldg., Baltimore, Md., $2,515.

Md., Annapolis—Circulating Water System—Spec. 4459—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 22 constructing at High Power Radio Sta., here, from Carroll Electric Co., Wash., D. C., $7,350 (60 days). Noted June 16.

D. C., Anacostia—Shop Building—Spec. 4389—Buerau Yards & Docks, Navy Dept., Wash., D. C., received bids June 20 building at Naval Air Sta., here, (1) work complete, from P. H. Sears, 410 Bond Bldg., Wash., D. C., (1) $32,730 (120 days), (2) $32,275, (3) $31,345, (4) deduct $20 and add $50, (5) deduct $0.20 add $0.90; W. F. Martens, 53 Franklin St., Rochester, N. Y., (1) $34,923 (135 days), (4) $0.20 add $0.35, (5) deduct $0.10 add $0.60, Hyde & Baxter, 1311 G St. N.W., Wash., D. C., (1) $34,610 (120 days), (2) $33,998 (120 days), (4) deduct $0.40 add $55 (5) deduct $0.40 add $0.90. Note June 9.

★**D. C., Wash.**—Searchlight Towers—U. S. Engineer, War Dept., let contract constructing 3 searchlight towers, here, to Elliott Machine Corp., 1111 Bush St., Baltimore, Md., $27,627.

D. C., Wash. — Storehouse—Quartermaster Dept. received bids constructing at Walter Reed General Hospital, here, from Skinker & Garrett, 1416 F St. N. W., $30,477; H. C. Ball Constr. Co., First Natl. Bank Bldg., $30,896; W. L. Smith, Wash., $31,200.

★**Va., Norfolk**—Embankment—U. S. Engineer, War Dept., let contract constructing embankment, here, to W. H. French Dredging & Wrecking Co., Norfolk, $20,848

Federal Government Work (Continued)

and George, Hawkins & George, Meadows and Manchester Sts., Richmond, $16,980.

★**Va., Norfolk**—Gun Platforms, etc—U. S. Engineer, War Dept., let contract constructing gun platforms, buildings, etc., at Fort Story, here, to Consolidated Eng. Co., Calvert Bldg., Baltimore, Md., $322,104.

Va., Norfolk — Machine and Carpenter Shop—Spec. 4382—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 22 constructing at Naval Operating Base, Air Sta., here, (1) work complete, from W. F. Martin, 53 Franklin St., Rochester, N. Y., (1) $109,934 (165 days) (1b) $108,434 (2) $61,674 (160 days) (2b) $60,-874 (3) $51,260 (3b) $50,460 (4) add $64 deduct $19 (5) add $1 70 deduct $55; H. Foulrod, 1406 Commonwealth Trust Bldg., Phila., Pa., (1) $114,300 (150 days) (1a) $114,300 (1b) $109,270 (2) $67,770 (2a) $67,770 (3) $53,830 (3a) $53,830 (3b) $51,-400 (4) add $70; F. G. Fearon, 280 Madison Ave., New York City, (1) $114,876 (150 days) (1a) $114,000 (1b) $113,376 (2) $68,206 (130 days) (2a) $67,700 (2b) $66,-800 (3) $53,860 (130 days) (3a) $53,700 (3b) $53,400 (4) $100 deduct $25. Noted June 9.

Va., Quantico — Breakwater — Spec. 4463—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 22, constructing extension to breakwater at Marine Barracks, here, (1) work complete, from C. C. Carpenter, Post Office Box 1243, Norfolk, (1) $27,391 (120 days) (2) add $25 deduct $12 (3) add $0.90 deduct $0.20; McLean Contg. Co., 1415 Fidelity Bldg., Baltimore, Md., (1) $28,000 (180 days) (2) add $50 deduct $5 (3) $1.10-$5; Newport Contg. & Eng. Co., Newport News, (1) $39,248 (120 days) (2) add $30 deduct $30 (3) add $0.50 deduct $0.30. Noted June 16.

Va., Quantico—Storerooms—Spec. 4469—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids constructing office and storerooms, in storehouse, at Marine Flying Field, here, (1) work complete, from E. G. Heiflin, Law Bldg., Fredericksburg, (1) $5,950 (45 days); Carpenter-Pietrich, P. O. Box 1243, Norfolk, $6,000 (45 days); Nelson & Boutyard, Quantico, $7,220 (45 days). Noted June 6.

Va., Quantico—Trestle, etc.—Spec. 4406—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 22 constructing trestle, bridge and concrete road, at Marine Flying Field, here, (1) work complete, from Monohan & Indach, 3001 Greenmount Ave., Baltimore, (1) $87,307 (120 days) (1a) $44,217 (120 days) (1b) $39,998 (1c) $38,242 (2) $73,788 (3) $61,047 (4) $17 (5) add $1.45 deduct $0.34; Raymond Concrete Pile Co., 140 Cedar St., New York City, (1) $94,900 (120 days), (1a) $69,700 (120 days), (1b) $66,178 (1c) $155,518 (2) $89,-398 (3) $76,298 (4) $15 deduct $5 (5) add $0.75 deduct $0.15; Alsop & Pierce, 1st Natl. Bank Bldg., Newport News, (1) $100,806 (120 days) (1a) $77,141 (120 days) (1b) $70,791 (1c) $57,113 (2) $91,926 (3) $73,-733 (4) add $20 deduct $11.50 (5) add $0.50 deduct $0.14. Noted June 16.

★**S. C., Paris Island**—Hospital Buildings—Spec. 4423—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing at Marine Barracks, here, to J. C. Crinnan, 305 Arcade Bldg., Norfolk, Va., $9,280 (80 days). Noted June 16.

★**Fla., Pensacola**—Water Filler Plant—Spec. 4385—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing, here, to Regan Constr. Co., 2 East Lexington St., Baltimore, $51,966 (150 days). Noted June 23.

★**O., Cincinnati**—Cement—U. S. Engineer, War Dept., let contract furnishng cement for Dams 34 and 36, to Wellston Iron Furnace Co., Jackson, $96,560; for dam 38, to Louisville Cement Co., $44,960.

Col., Denver—Hospital Additions, etc.—Constructing Quartermaster of Fitzsimmons General Hospital received bids constructing additions to hospital, here, from W. J. Cameron Constr. Co., Chamber of Commerce Bldg. About $807,000 Noted June 3 under "Wash., D. C.

★**Mo., East St. Louis** (St. Louis P. O.)—Railway—U. S. Engineer, War Dept., let contract constructing, here, to Myers Constr. Co., Manchester and Yale Sts., St. Louis. About $45,000.

★**Mo., St. Louis** — Levee Work — Mississippi River Comn., 1311 International Bldg., let contract constructing levee enlargement in Hunt D.D., Ill., to Roach, Stansell & Lawrence Bros. & Co., North Memphis Savings Bank Bldg., Memphis, Tenn., $17,-600. Noted June 3.

★**Mo., St. Louis** — Levee Work — Mississippi River Comn., 1311 International Life Bldg., let contract for levee enlargment in Sny Island Levee D.D., Ill., to Roach, Stansell & Lawrence Bros. & Co., North Memphis Savings Bank Bldg., Memphis, Tenn., $50,160. Noted June 3.

★**Tex., Point Isabel**—Fuel Oil Storage Building — Spec. 4438 — Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing, at Natl. Training Sta., here, to J. McCoy, Monroe and 10th Sts., Brownsville, $2,110 (90 days). Noted June 9.

★**Wash., Seattle**—Dredging U. S. Engineer, War Dept., let contract dredging in Lake Washington Ship Canal, here, to Henry & McFee, Seattle. About $83,200.

★**Cal., Mare Island**—Moving Building—Spec. 4451—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract moving building to Marine Corps Reservation, here, to Brown & Frederickson, 46 Kentucky St., Vallejo, $24,000 (128 days).

★**Cal., Mare Island** — Radio Quarters — Spec. 4430—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing, here, to C. C. Holt, 180 Jessie St., San Francisco, $26,492 (120 days). Noted April 28.

★**Cal., San Diego**—Apartment—Spec. 4427—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract constructing, at North Island, here, to W. Slater Co., 2314 Santa Fe Ave., Los Angeles, $8,900 (95 days). Noted May 12.

Cal., San Diego — Machine Shop — Spec. 4411—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids constructing machine shop, latrine, fire engine house, etc., here, (1) work complete, from A. W. Crist Co., 311 Hoge Bldg., Seattle, Wash., (1) $155,475, (140 days), (2) $153,475, (140 days), (3) $146,475, (140 days), (4) $18,-195, (5) $26,846; K. E. Parker & Co., 519 California St., San Francisco, (1) $200,000 deduct $71,100 (150 days), (2) $200,000 deduct $71,850 (150 days), (3) $200,000 deduct $78,600, (4) $15,000 add $3,250, (5) $25,000 add $500; Lange & Bergstrom, 819 Timken Bldg., (1) $160,-239 deduct $11,500 (300 days), (2) $161,239 deduct $12,900, (3) $56,968 deduct $15,000, (4) $23,090 deduct $1,200, (5) $31,850 deduct $2,200. Noted June 9.

Cal., San Diego—Sewer and Water Systems—Spec. 4365—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 22, constructing, at Naval Base, Training Sta., here (1) work complete, from Miller & Eddleman, Central Mortgage Bldg., (1) $50,000 deduct $31,000, (2) $149,000 deduct $32,100 (3) $5.50 (4) $2.50 add $3 (5) $3.50 (5a) $1.25 deduct $0.10 (6) $6 (7) $0.75 (8) $0.60 deduct $0.30; DeWard & Cobham, 207 Granger Bldg., (2) $109,545 deduct $6,200 (150 days) (3) add $6 deduct $5 (4) $2.25 add $1 (5) $1 (6) $2.50 (7) $0.50 (8) $1; Lange & Bergstrom 819 Timken Big., (1) $145,000 (2) $143,000 (3) add $12 deduct $5 (4) add $3 deduct $1 (5a) $3 (5b) $2.50 (5c) deduct $0.50 (6) add $7 deduct $3 (7) $2 (8) add $25 (3) $5.50 deduct $0.25 (240 days). Noted June 3.

Miscellaneous

PRICES AND CONTRACTS AWARDED

Broken Stone and Screenings—Long Island City, N. Y.—M. E. Connolly, pres. Queens Boro., received bids June 23, furnishing and delivering 23,000 cu.yd. broken stone and screenings, from Tuohy & Upton, 98 Main St., Flushing, $3.06 per cu.yd., total cost, $70,380; G. C. Deebach, $3.22, $74,060; Peace Bros., 20 Main St., Flushing, $3.25, $74,450. Noted June 16.

Tunnel—Detroit, Mich.—City plans to build 2,000 ft. tunnel inside diameter 17 ft., under Elmwood and Mt. Eliott Cemeteries. About $300,000. J. Reid, Municipal Courts, engr.

Dock—Superior, Wis.—Great Northern R.R., 4th and Jackson Sts., St. Paul, Minn., having plans prepared for concrete and steel ore loading dock, concrete foundation, 62½ ft. wide, 1812 ft. long and 75 ft. high, on Allouez Bay, to contain 302 pockets and afford storage capacity for 90,600 tons. About $1,500,000. A. H. Hogeland, ch. engr.

Heating and Ventilating System — Wallaceburg, Ont.—Separate School Bd. plans to install steam heating and ventilating system in 8 room school. About $30,000. M. McCarron, secy.

BIDS DESIRED

St. Paul, Minn.—See "Streets and Roads."

Steel Cells—Wende (Milligrove P. O.), N. Y.—Until July 5, by Bd. Supervs., City Hall, Buffalo, furnishing and erecting 300 steel cells for new penitentiary, here. About $200,000. G. C. Diehl, Ellicott Sq. Bldg., Buffalo, engr.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**Sheet Pile Bulkhead—Brooklyn, N. Y.**—M. Hulbert, comr. Docks, Pier "A," foot of Battery Pl., North River, New York City, let contract reconstructing sheet pile bulkhead, along Shore Blvd., Sheepshead Bay, here, Contr. 1715, to G. W. Rogers & Co., Inc., 29 Bway., New York City, $47,-376. Noted June 23.

★**Dumping Board—New York, N. Y.**—M. Hulbert, comr. Docks, Pier "A," foot of Battery Pl., North River, let contract building substructure for proposed dumping board, on East 35th St., to Phoenix Constr. Co., 41 Park Row, $69,797. Noted June 23.

Plumbing — Wash., D. C. — Dist. Comrs., 509 Dist. Bldg., received bids constructing plumbing in Gallinger Hospital, (a) using John Douglas fixtures (b) crane fixtures, from Standard Eng. Co., 2129 Eye St. N. W. (a) $54,000 (b) $56,690; I. Freund, 1315 7th Ave., (a) $58,000; M. P. Casey, Wash., (a) $56,965 (400 days).

Stadium—Columbus, O.—Ohio State University, Columbus, received bids June 24, building steel and cement stadium, involving 26,000 yd. concrete, 3,500 ton steel, 5,000 yd. excav. and 63,000 wooden seats, etc., from E. H. Latham Co., 60 East Broad St., $1,320,000; Unit Constr. Co., Title Guarantee Bldg., St. Louis, Mo., $1,-424,500; R. H. Evans & Co., Ferris Bldg., $1,437,405. Noted June 16.

★**Steel—Marblehead, O.**—Kelly Island Lime & Transport Co., Leader-News Bldg., Cleveland, let contract furnishing 1,300 ton steel for 1 story stone crusher plant, to Jones & Laughlin Steel Co., Pittsburgh. Noted June 2, under "Industrial Works."

★**Plumbing, Heating and Ventilating System—Sarnia, Ont.**—High School Bd. let contract for plumbing, heating and ventilating system in Wellington St. School, to J. Filsinger, 144 Christina St. N. About $82,000.

★**Underground Conduits—Montreal, Que.**—City let contract building underground conduits in St. James, Notre Dame and Commissioners Sts., to G. M. Gest & Co., Ltd., Power Bldg., $161,906.

Applications before the Federal Power Commission, Washington, D. C., from April 16 up to and including May 7.

208. City of Los Angeles, Dept. of Pub. Serv., 603 Knickerbocker Bldg., Los Angeles, Cal. Preliminary permit for two power installations in San Francisquito Canyon, in connection with Los Angeles Owens River Aqueduct. The plants will be placed in series, and will take water from the aqueduct in Sect. 2, T. 6 N., R. 15 W., and will return the water thereto in Sect. 11, T. 6 N., R. 16 W., S. B. M., in Los Angeles Co., Cal. The city is also applying for a license for the upper one of these plants, for public utility.

209. Royal Development Co., J. Naughten, President, Wenatchee, Wash. License to divert Dry Creek into Chipmunk Creek. Divert Chipmunk Creek, through pipe line ¼ mi. long, to a power house in applicant's St. Francis Tunnel, in T. 30 N. R. 16 E., W. M., in Chelan Co., Wash. Applicant also requests a license for a proposed power project consisting of a diversion dam in unnamed branch of Phelps Creek, pipe line 1,500 ft. to a power house on Phelps Creek, at applicant's Leprechaun Tunnel, in T. 30 N., R. 16 E., W. M., Chelan Co., Wash., for power for mining.

210. Yosemite Power Co., Groveland, Cal. Preliminary permit for two reservoirs, a conduit and power house in South Fork of Tuolumne River, a diversion dam on main stream, just below mouth of South Fork, and a 17-mi. conduit to a second power house at Wards Ferry.

211. Harry W. Deprez, Shelbyville, Ind. License for power development at U. S. Government Dam No. 5, on Muskingum River, at Luke Chute, Ohio, for public utility.

OFFICIAL PROPOSALS

Bids: July 1.

Construction of Bridge and Canal Terminal

STATE OF NEW YORK
OFFICE OF SUPERINTENDENT OF PUBLIC WORKS

Albany, N. Y.

Sealed proposals will be received by the undersigned at his office in the Capitol at Albany, N. Y., until twelve o'clock noon of Friday, July 1st, 1921, at which place and hour they will be publicly opened and read.

For constructing a bridge across the Hudson River between 112th Street, Troy, and Ontario Street, Cohoes, pursuant to the provisions of Chapter 907 of the Laws of 1920.

Sheets 1 to 24 inclusive.

And for the construction of Barge canal terminals pursuant to the provisions of Chapter 746 of the Laws of 1911, and amendatory laws, and Chapter 176 of the Laws of 1921, as follows:

TERMINAL CONTRACT NO. 230

For constructing a terminal freighthouse at Rochester.

Contract plans, Sheets 1 to 23, inclusive.

Plans may be seen and detailed specifications, engineer's estimates of quantities, proposal blanks, form of contract and bonds required and other information for proposers may be had at the office of the Superintendent of Public Works at Albany, N. Y., at the office of the Assistant Superintendent of Public Works for the Middle Division at Syracuse, N. Y., at the office of Assistant Superintendent of Public Works for the Western Division at Rochester, N. Y., and at the office of the Superintendent of Public Works, Erie Basin Terminal, Buffalo, N. Y., and at the office of the Superintendent of Public Works, Terminal Warehouse, Pier 6, East River, New York City.

Copies of detailed plans or drawing may be obtained from the State Engineer and Surveyor at Albany, N. Y., upon payment to him of the cost of producing them.

Monthly estimates will be paid of ninety per centum (90 per cent) of the work done at the contract price. Every proposal for said work must be accompanied by a money deposit in the form of a draft or certified check upon some good banking institution in the city of Albany or New York, issued by a national or state bank or trust company in good credit within the state and payable at sight to the Superintendent of Public Works for five per centum (5 per cent) of the amount of the proposal.

The person whose proposal shall be accepted will be required to execute a contract and furnish bonds within ten days from the date of notice of award delivered to him or them in person or mailed to the address given in the proposal.

Upon execution of the contract and approval of bonds, the certified check or draft will be returned to the proposer unless the same shall have been presented for collection prior to such time, in which case the amount of the deposit will be refunded by the Superintendent of Public Works.

The deposits of bidders other than the one to whom the award of contract shall be made will be returned immediately after the award has been made.

The bond required for the faithful performance of each contract shall be in such sum as shall be fixed by the Superintendent of Public Works, which sum shall not be less than twenty per centum (20 per cent) of the estimated cost of the work, according to the contract price and an additional bond, known as the labor bond, in the sum of ten per centum (10 per cent) of the amount of the estimated cost of the work, according to the contract price, will be required as security that the contractor will pay in full at least once in each month all laborers employed by him upon the work specified to be done in the contract.

In the event that more than one surety company is offered as surety on said bonds co-insurance only will be accepted.

Each proposal must be addressed to the Superintendent of Public Works, Albany, N. Y., and must be endorsed on the envelope with the name of the construction for which the proposal is made.

Award, if made, will be made to the person or persons whose proposal shall be lowest in cost to the state for doing the work and which shall comply with all provisions required to render it formal. Before any award shall be made the lowest bidder will be required to satisfy the Superintendent of Public Works of his ability to provide suitable equipment and materials for the proper performance of the work.

The right is reserved to reject all proposals and readvertise and award the contract in the regular manner if, in the judgment of the undersigned, the interests of the state will be enhanced thereby.

CHARLES L. CADLE.

June 1, 1921.

The publication of an advertisement on this page is an official notice that bids are wanted from other than local bidders.

It is also a guarantee that maximum competition is invited because Engineering News-Record is the *one* nationally recognized medium for Proposal advertising. Its Searchlight Section is read each week by nearly every worth-while contractor in this country who bids on public work outside his own city.

Official Proposals reaching our office in first mail Tuesday morning (10 o'clock) can usually be published in the issue out the following Thursday. Special price for Official Proposals, 40 cents a line.

Bids: July 5.

Street Improvement

Village of Victor, N. Y.

Sealed proposals will be received by the Board of Trustees of the Village of Victor, N. Y., until two o'clock p.m., on the 5th day of July, 1921, for the improvement of Maple Avenue, consisting of about 8,000 square yards of brick pavement on concrete base, curbing and other accessories.

Plans and specifications, etc., may be seen at the office of the Board, at Victor, N. Y., or at the office of Hopkins & Field, Engineers, 349 Cutler Bldg., Rochester, N. Y.

The Board hereby reserves and has the right to reject any or all bids or to accept any that in its judgment will be for the best interests of the village.

A surety bond satisfactory to the Board in form, and in amount of $20,000 will be required of him to whom the contract may be awarded.

A certified check made payable to the Board of Trustees of Victor, N. Y., to the amount of $2,000 must be deposited by each bidder and accompany his bid as a guarantee that in case the contract is awarded to him, he will, within ten days thereafter, execute such contract and furnish his bond.

Bids must be sealed and addressed to "The Board of Trustees, Victor, N. Y.," and marked on the outside of the envelopes, "Proposal for Maple Avenue Improvement."

EDGAR B. CASE, President.
ROY O. SMITH,
JAMES TOBIN, JR.,
WM. B. MOORE, Trustees.

MICHAEL KEATING, Clerk.

Dated: Victor, N. Y., May 31, 1921.

Bids: July 11.

Construction of Bridge

Pikeville, Ky.

Sealed proposals will be received by The Fiscal Court of Pike Co., Ky., at the office of the County Judge on Monday, July 11, 1921, until 2 p.m., for the construction and erection of a steel highway bridge (substructure and superstructure complete) across Russel Fork of Big Sandy River, at Marrowbone Station, Pike County, Ky. The length of proposed bridge is 420 ft. (3 140 ft. spans) with 16 ft. roadway.

Plans and specifications prepared by the Kentucky Dept. of Public Roads are on file at the office of Frank L. Haynes, County Road Engineer, 3d floor, First National Bank Bldg., Pikeville, Ky., and may be inspected by prospective bidders during business hours. The standard proposal form is attached to specifications. Bids on alternate plans will also be received and considered; however, any bidder submitting an alternate plan must also submit bid on plans already prepared. Alternate designs, in regard to loading, stresses and quality of material, etc., must conform to the requirements of Kentucky State Highway Standard specifications for bridges. Contractors desiring copies of plans and specifications will apply to Bridge Engineer, Ky. Dept. Public Roads, Frankfort, Ky.

Contractors who wish to submit alternate plans will be furnished on request, with blue print of situation plan and profile of bridge site, by County Road Engineer.

All bids must be accompanied by a certified check of $2,500 payable to the order of the Treasurer of Pike County.

The Fiscal Court reserves the right to reject any and all bids.

By order of the Fiscal Court of Pike County, Ky.

FRANK L. HAYNES,
County Road Engineer.

E. E. TRIVETT, County Judge.
JOHN DILS, Special Commissioner.

Bids: July 12.

Hudson River Vehicular Tunnel

CONTRACT No. 2
NORTH LAND SHAFT SOUTH LAND SHAFT
JERSEY CITY, N. J.
NEW YORK STATE BRIDGE AND TUNNEL COMMISSION AND
NEW JERSEY INTERSTATE BRIDGE AND TUNNEL COMMISSION

Sealed proposals for the construction of two shafts in the city of Jersey City, N. J., for the vehicular tunnel under the Hudson River will be received at the office of the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission, Room 617 Hall of Records, Borough of Manhattan, New York City, until July 12, 1921, at 3 o'clock p.m. daylight saving time, at which time they will be publicly opened and read.

This contract will include the furnishing of labor and materials for all work required in the construction and sinking of two shafts, located in the Erie Railroad Yard, Jersey City, N. J., about one hundred forty (140) feet west of the bulkhead and approximately in the extended line of Twelfth Street, and the care and support of buildings, sewers, pipes, railroads and other surface, sub-surface and overhead structures, the maintenance of traffic and the restoration of pavements and other surfaces.

Proposals must be in the form and on the blanks prescribed by the Commissions, and must be accompanied by two certified checks for $12,500 each.

Plans, form of proposal, contract and specifications may be obtained by prospective bidders from C. M. Holland, Chief Engineer, Room 614 Hall of Records, New York City, N. Y. A payment of $5 will be required.

The Commissions reserve the right to reject any and all bids.

GEORGE R. DYER, Chairman,
New York State Bridge and Tunnel Commission.

T. ALBEUS ADAMS, Chairman,
New Jersey Interstate Bridge and Tunnel Commission.

OFFICIAL PROPOSALS

Bids: July 13.

Highway Work

OFFICE OF THE STATE COMMISSION OF HIGHWAYS

Albany, N. Y.

Sealed proposals will be received by the undersigned at their office, No. 55 Lancaster Street, Albany, N. Y., at one o'clock p.m., advanced standard time which is twelve o'clock noon eastern standard time, on Wednesday, the 13th day of July, 1921, for the improvement of highways in the following counties:

Chautauqua .....
(two highways: 1.32 and 2.94)
Cortland .....(approx. 3.67)
Delaware .....(approx. 4.98)
Greene .....
(two highways: 4.13 and 3.98)
Ontario .....
(two highways: 3.20 and 8.81)
Rensselaer .....
(two highways: 1.95 and 5.46)
St. Lawrence .....
(two highways: 5.74 and 6.45)
Seneca .....(approx: 3.20)
Steuben .....
(two highways: 4.03 and 2.85)
Yates .....(approx: 8.81)

ALSO FOR THE REPAIR OF HIGHWAYS IN THE FOLLOWING COUNTIES:

RECONSTRUCTION

Erie .....(one contract)
Genesee .....(one contract)
Jefferson .....(one contract)
Westchester .....(one contract)

Maps, plans, specifications and estimates may be seen and proposal forms obtained at the offices of the Commission in Albany, N. Y., and also at the offices of the division engineers in whose division the roads are to be improved or repaired. The addresses of the division engineers and the counties in which they are in charge will be furnished on request.

The especial attention of bidders is called to "Special Information for Bidders" in the itemized proposal specifications and contract agreement.

HERBERT S. SISSON, Commissioner.

J. C. FINCH, Acting Secretary.

Dated: June 6, 1921.

Road Construction

Kissimmee, Fla.

Notice is hereby given that bids will be received by the Board of County Commissioners of Osceola County, Florida, up to and including 10 a.m. Tuesday, July 11, 1921, at the office of the Clerk of the Circuit Court of said County at Kissimmee, Florida, for the construction of approximately ten miles of hard surface road, being part of the road known as the Kissimmee-Melbourn Road.

Plans and specifications may be examined at the office of the Clerk of the Circuit Court of Osceola County, Florida, at Kissimmee, Florida.

Certified check in the amount of $3,000 must accompany each bid, and the successful bidder will be required to give a bond, satisfactory to said board, for twenty per cent of the bid.

Rights are reserved to reject any and all bids. J. L. OVERSTREET,

Clerk of the Board of County Commissioners of Osceola County.

Bids: July 5.

Construction of Pavement

Shreveport, La.

Sealed proposals will be received by M. B. Rankin, Clerk, South Highlands, La. (Shreveport, La.) until 8:30 p.m., July 5, 1921, for constructing approximately the following:

17,946 square yards asphaltic concrete paving, including concrete gutter and grading.
1,261 square yards brick paving.
10,261 lin.ft. concrete curbing.
350 lin.ft. 18-in. vitrified pipe in place.
90 lin.ft. 15-in. vitrified pipe in place.
10 inlets or catch basins.
5 cubic yards concrete headwalls and wings.

Bidding blanks and specifications may be obtained from H. E. Barnes, Engineer, City Hall, Shreveport, La.

Bids must be accompanied by certified check for 5 per cent of total cost.

OFFICIAL PROPOSALS

Bids: July 6.

Repairing Bridge

STATE OF NEW JERSEY
STATE HIGHWAY COMMISSION

Trenton, N. J.

Notice is hereby given that sealed bids will be received by the State Highway Commission of New Jersey for the following:

Repairs to Bridge over Matawan Creek, M.P. 101.2 on Route No. 4, Section 4, in the municipalities of Matawan and Keyport, Monmouth County, New Jersey: Placing temporary bents under existing bridge; building new abutments and piers; reinforcing, adjusting and painting old work; repairs to wooden deck on old bridge; paving new work; repairs to fenders and dolphins and removal of struts now in bottom of stream. Work includes repair and adjustment of electric navigation lights.

Bids for the above will be received at the office of the State Highway Commission, Broad St. Bank Building, Trenton, N. J., on Wednesday, July 6, 1921, at 11 a.m. standard time, and opened and read immediately thereafter.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of the State Highway Department, Trenton, N. J., and office of Charles A. Mead, Bridge Engineer, 790 Broad St., Newark, N. J., and may be inspected by prospective bidders. Plans will be furnished on deposit of ten ($10) dollars for this bridge upon application to Charles A. Mead, Bridge Engineer, 790 Broad St., Newark. Bids must be made on the standard proposal forms in the manner designated therein and as required by the 1921 specifications, same to be enclosed in sealed special addressed envelopes bearing the name and address of bidder and the name and section of the route on the outside, and must be accompanied by a certified check drawn to the order of the State Treasurer for not less than ten (10%) per cent of the amount of the bid, provided that said certified check shall not be less than $500 or more than $20,000, and be delivered at the above place on or before the hour named. Copies of the standard proposal form and special addressed envelope will be furnished upon application to Charles A. Mead, Bridge Engineer, 790 Broad St., Newark, N. J. Bids not enclosed in special envelope will be considered informal and will not be opened.

Each bidder must accompany his bid with a certificate from a surety company duly authorized to do business in this State, stating that such surety company will provide said bidder with a bond in such sum as is required in and in accordance with the specifications, conditioned for the faithful performance of the provisions of the contract and specifications.

By order of the State Highway Commission.

A. LEE GROVER, Chief Clerk.

Bids: July 5.

Construction of Curbs and Sidewalks

Boonton, N. J.

Notice is hereby given that sealed proposals will be received by the Board of Alderman of the Town of Boonton, on Tuesday, July 5, 1921, at 8:30 o'clock p.m. (daylight saving time) at the Aldermanic Chambers, Main Street, at which time and place the said proposals will be opened and read for the construction of Curbs and sidewalks on the following streets:

Lathrop Avenue, Myrtle Avenue and Liberty Street.

Lathrop Avenue from Washington Street to Vreeland Avenue.

Myrtle Avenue from Henry Salmon & Son property to Fulton Street on the northerly side.

Liberty Street between Main and Birch Streets.

Plans and specifications may be received at the office of the Town Clerk, 716 Main Street, Boonton, N. J.

Proposals must be addressed to W. R. Bailey, Clerk, and marked Proposals for Curbs and Sidewalks, accompanied by a certified check not less than ten per cent of the estimated amount, with a certificate from a surety company authorized to do business in New Jersey, stating that such surety company will provide the bidder with a bond in such sum and for such purposes as required by the specifications.

The Board of Alderman reserves the right to reject any or all bids.

WILLIAM R. BAILEY, Clerk.

OFFICIAL PROPOSALS

Bids: July 12.

Western Junior High School

Norfolk, Va.

Sealed proposals for the erection of the Western Junior High School Building will be received at the office of The Norfolk City School Board, Bankers Trust Building, Norfolk, Virginia, up to 2 p.m., Tuesday, July 12th, and will be publicly opened at that hour.

To be eligible as a bidder, applicant not now resident in Norfolk must show satisfactory references as to their ability to execute the work covered by this contract, and as to their financial responsibility.

Plans and specifications can be obtained on personal application to Calrow, Wrenn & Tazewell, Architects, New Monroe Building, Norfolk, Virginia, after 10 a.m., June 13th.

A certified check for one hundred dollars—payable to the Architects—must be tendered (by each General Contractor) for the drawings. This check will be returned when the plans and specifications are returned.

Additional sets of plans and specifications for use during the bidding will be furnished parties interested, in the order of applications received, at the cost to said parties of $25 per set—to be paid to the Architects in advance—these additional sets, however, to remain the property of Architects, and to be returned after the opening of the bids.

A certified check for Five Thousand Dollars ($5,000), payable to E. L. Myers, Chairman, is to accompany each bid.

Bonds will be required as set forth in the specifications.

The right is reserved to reject any and all bids.

SCHOOL BOARD OF THE CITY OF NORFOLK,
By Building and Property Committee,
E. L. MYERS, Chairman.

Bids: July 6.

Highway Construction

Belvidere, N. J.

Notice is hereby given that sealed bids will be received by the County of Warren for the construction of State Highway Route No. 12, Section No. 4, from New Village to Mariatt's Corner, in Franklin and Washington Townships, in the County of Warren, with a Portland Cement Reinforced Concrete Pavement; estimated amount of pavement required is 53,370 square yards. Work to be performed under County Reimbursement Act, Chapter 183, Laws of 1918, and amended by Chapter 317, Laws of 1920.

Bids will be opened and read in public at the Court House, Belvidere, New Jersey, on Wednesday, July 6, 1921, at 11 o'clock a.m. Standard Time.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of Harry W. Vetter, County Engineer, Court House, Belvidere, New Jersey, and in the office of the State Highway Department, Trenton, New Jersey, and may be inspected by prospective bidders. Plans will be furnished on deposit of ten dollars ($10) upon application to Harry W. Vetter, County Engineer. Bids must be made on the standard proposal forms in the manner designated therein and as required by the 1921 specifications, enclosed in sealed envelopes addressed to Albert B. Craig, Director of the Board of Chosen Freeholders of the County of Warren, and bearing the name and address of the bidder and the name and section of the route on the outside. Bids must be accompanied by a certified check drawn to the order of H. O. Carhart, County Treasurer, for not less than ten per cent (10) of the amount of the bid, provided that said certified check shall not be less than $500 or more than $20,000, and be delivered at the above place on or before the hour named. Copies of the standard proposal form will be furnished on application to Harry W. Vetter, County Engineer.

Each bidder must accompany his bid with a certificate from a surety company, duly authorized to do business in this State, stating that such surety company will provide said bidder with a bond in such sum as is required in, and in accordance with the provisions of said specifications, conditioned for the faithful performance of the provisions of the contract and specifications.

Each bidder must also accompany his bid with the standard form of "Statement of Equipment" properly filled out.

By order of the Board of Chosen Freeholders of the County of Warren.

MORRIS S. FAUST, Clerk.

OFFICIAL PROPOSALS

Bids: July 13.

Highway Construction

Belvidere, N. J.

Notice is hereby given that sealed bids will be received by the County of Warren for the construction of State Highway Route No. 12, Section No. 5, from Marlatt's Corner to Fort Golden, in the Township of Washington, Borough of Washington, County of Warren, with a Portland Cement Reinforced Concrete Pavement; estimated amount of pavement required is 44,763 square yards. Work to be performed under County Reimbursement Act, Chapter 183, Laws of 1918, and amended by Chapter 317, Laws of 1920.

Bids will be opened and read in public at the Court House, Belvidere, New Jersey, on Wednesday, July 13, 1921, at 11 o'clock a.m. Standard Time.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of Harry W. Vetter, County Engineer, Court House, Belvidere, New Jersey, and in the office of the State Highway Department, Trenton, New Jersey, and may be inspected by prospective bidders. Plans will be furnished on deposit of ten dollars ($10) upon application to Harry W. Vetter, County Engineer. Bids must be made on the standard proposal forms in the manner designated therein and as required by the 1921 specifications, enclosed in sealed envelopes, addressed to Albert B. Craig, Director of the Board of Chosen Freeholders of the County of Warren, and bearing the name and address of the bidder and the name and section of the route on the outside. Bids must be accompanied by a certified check drawn to the order of H. O. Carhart, County Treasurer, for not less than ten per cent (10) of the amount of the bid, provided that said certified check shall not be less than $500 or more than $20,000, and be delivered at the above place on or before the hour named. Copies of the standard proposal form will be furnished on application to Harry W. Vetter, County Engineer.

Each bidder must accompany his bid with a certificate from a surety company, duly authorized to do business in this State, stating that such surety company will provide said bidder with a bond in such sum as is required in, and in accordance with the provisions of said specifications, conditioned for the faithful performance of the provisions of the contract and specifications.

Each bidder must also accompany his bid with the standard form of "Statement of Equipment" properly filled out.

By order of the Board of Chosen Freeholders of the County of Warren.

MORRIS S. FAUST, Clerk.

Bids: July 6.

Highway Work

OFFICE OF THE STATE COMMISSION OF HIGHWAYS

Albany, N. Y.

Sealed proposals will be received by the undersigned at their office, No. 55 Lancaster Stree, Albany, N. Y., at one o'clock p.m., advanced standard time which is twelve o'clock noon Eastern Standard time, on Wednesday, the 6th day of July, 1921, for the improvement of highways in the following counties:

Cayuga	(approx. 5.39)
Hamilton, one completion	(two highways: 3.02 & 6.72)
Livingston	(approx. 2.16)
Monroe	(approx. 3.69)
Niagara	(approx. 2.49)
Rockland	(approx. 3.85)
Steuben	(three highways: 3.95; 1.73; 0.26)
Warren	(approx. 0.05)
Washington	(approx. 2.39)
Yates	(approx. 1.70)

ALSO FOR THE REPAIR OF HIGHWAYS IN THE FOLLOWING COUNTIES:

RECONSTRUCTION

Clinton	(one contract)
Monroe	(one contract)
Otsego	(one contract)
Steuben	(one contract)

Maps, plans, specifications and estimates may be seen and proposal forms obtained at the office of the Commission in Albany, N. Y., and also at the offices of the division engineers in whose division the roads are to be improved or repaired. The addresses of the division engineers and the counties in which they are in charge will be furnished on request.

The especial attention of bidders is called to "General Information for Bidders" in the itemized proposal, specifications and contract agreement.

HERBERT S. SISSON, Commissioner.

J. C. FINCH, Acting Secretary.

OFFICIAL PROPOSALS

Bids: July 11.

Street Paving

Canyon City, Tex.

Sealed Proposals addressed to J. D. Gamble, Mayor, for the improvement of certain streets in Canyon City, Texas, will be received at the office of the Mayor, at Canyon City, Texas, until one o'clock, p.m., July 11, 1921, and then publicly opened and read.

DESCRIPTION OF WORK TO BE DONE

865.0 Cubic yards excavation;
302.4 Cubic yards borrow;
2565.0 Lineal feet broken stone drain;
8915.0 Square yards 3-in. Thurber vertical fiber brick paving on 5-in. concrete base;
384.0 Lineal feet oak header;
1 Catch basin and manhole complete with connection to sewer.

Detailed plans and specifications of the work may be seen for examination, and information may be obtained at the office of the City Clerk of Canyon City, Texas, at Canyon City, Texas, and at the office of the engineer, C. L. Hasie, at Littlefield, Texas.

A certified check for fifteen hundred dollars ($1,500) made payable without recourse to the order of J. D. Gamble, Mayor of Canyon City, must accompany each proposal, as a guarantee that the bidder will, if necessary, promptly execute a satisfactory contract and furnish a good and sufficient bond in accordance with the requirements of the specifications. The right is reserved by the party of the first part to reject any and all proposals or to waive all technicalities.

Proposals shall be submitted in sealed envelopes and marked, "Bids for the paving of Houston and Evelyn streets (from West First to East First Streets) and West First and East First streets (from Houston to Evelyn streets) in Canyon City."

All bids received will be retained by the City and will not be returned to the bidders.

Bids: July 9.

Paving

Lambertville, N. J.

Notice is hereby given that sealed bids will be received by the Board of Commissioners of the City of Lambertville for the paving of portions of Main, York and Bridge Streets in said city with a sheet asphalt pavement upon a rebuilt macadam base; estimated surface pavement required 18,195 square yards, and opened and read in public at the Board of Commissioners' Rooms on Bridge Street, Lambertville, New Jersey, on July 9, 1921, at the hour of 10 a.m., Standard Time.

Drawings, specifications and form of bid, contract and bond for the proposed work prepared by Grant Davis, the Engineer, for the City of Lambertville, and approved by the State Highway Commission, have been filed in the office of said engineer at Whitehouse Station, New Jersey, and of said Highway Commission, Trenton, N. J., and may be inspected by prospective bidders during business hours.

Bidders will be furnished with a copy of specifications and drawings by the engineer on proper notice and payment of cost of preparation.

Bids must be made on the standard proposal forms in the manner designated therein, and required by the specifications must be enclosed in sealed envelopes bearing the name and address of bidder and name of Road on the outside, addressed to the Board of Commissioners, Lambertville, New Jersey, and must be accompanied by a certified check equal to ten per cent of the bid.

By order of the Board of Commissioners of the City of Lambertville.

I. M. SMITH, Clerk.

Bids: July 5.

Construction of Pavement

Shreveport, La.

Sealed proposals will be received by J. C. Flanagan, Sec'y.-Treas., Shreveport, La., until ten o'clock a.m., July 5, 1921, for approximately 48,520 square yards Brick, Asphaltic Concrete, or Bitulithic Paving and approximately 6,000 square yards Brick Paving along car tracks.

Bidding blanks and specifications may be obtained from H. E. Barnes, City Engineer, City Hall.

Bids must be accompanied by certified check for five percent of total cost.

OFFICIAL PROPOSALS

Bids: July 8.

Street Paving

Middletown, N. Y.

Notice is hereby given that sealed proposals for the paving of Monhagen Avenue, Harding Street, Fulton Street, Sterling Street and West Main Street, total approximate yardage 23,500 sq.yd. in accordance with specifications prepared for this work, will be received by the Board of Estimate and Apportionment, at the City Clerk's office in the City Hall, Middletown, N. Y., until 7 p.m., July 8, 1921, and will then be publicly opened.

Proposals must be made upon and in accordance with forms which will contain accompanying instructions to bidders and a copy of the specifications for the said work and can be obtained at the office of the Commissioner of Public Works, Middletown, N. Y., on or after June 23, 1921.

Proposals shall be made and received upon the following conditions:

Each proposal must be accompanied by a certified check payable to the order of City Treasurer in the sum of Two Thousand Dollars ($2,000).

The Board reserves the right to reject any or all bids submitted to it.

All deposits except that of the successful bidder will be returned.

Upon acceptance of his bid the successful bidder shall execute a contract in accordance with his proposal and furnish a suitable security bond in the sum of fifty (50) per cent of the amount of the contract, conditioned for the faithful, prompt performance and completion of the work specified in the contract; if he neglects or refuses to execute said contract and furnish said bond the deposit heretofore mentioned of Two Thousand Dollars ($2,000) shall be forfeited and retained by the City of Middletown, N. Y., as liquidated damages.

Board of Estimate and Apportionment, City of Middletown, N. Y.

By JOHN A. KORSCHEN, Commissioner of Public Works.

Bids: July 5.

Construction Work

Boonton, N. J.

Notice is hereby given that sealed proposals will be received by the Board of Alderman of the Town of Boonton on Tuesday, July 5, 1921, at 8:30 o'clock p.m. (Daylight Saving Time) at the Aldermanic Chambers, Main Street, Boonton, at which time and place the said proposals will be opened and read for the construction of a concrete retaining wall along the westerly side of Union Street and the construction of two-inch Galvanized Pipe Guard Fence on the westerly side of William Street and the building of Storm Sewer Catch Basin, all in the Town of Boonton, Morris County, New Jersey.

Plans and specifications may be received at the office of the Town Clerk, 716 Main Street, Boonton. Proposals must be addressed to W. R. Bailey, Clerk, and marked Proposals for Concrete Wall, Galvanized Pipe Guard Fence and Building Storm Sewer Catch Basin, accompanied by a certified check not less than ten per cent of the estimated account.

The Board of Alderman reserves the right to reject any or all bids.

WILLIAM R. BAILEY, Clerk.

Bids: July 5.

Paving

Longmont, Col.

Sealed bids will be received by the City Clerk of the City of Longmont, Col., for the construction of approximately 33,500 square yards of six-inch concrete paving, and 6,800 lineal feet of concrete curbing, together with 9,500 cu.yd. of excavation grading and other necessary appurtenances at his office in the City Hall of the said City of Longmont, up to the hour of 5 o'clock p.m., July 5, 1921.

Proposal blanks, specifications, contract, etc., may be secured from the City Clerk or the City Engineer of the said City.

A certified check for $2,500, payable to the City Treasurer of the City of Longmont, must accompany the proposal as an evidence of good faith.

The City Council of the said City reserves the right to reject any and all bids.

GEORGE H. STENEX, City Clerk.

OFFICIAL PROPOSALS

Bids: July 9.

Sanitary Sewers

Miamisburg, O.

Sealed proposals will be received at the office of the Clerk of the Village of Miamisburg, Ohio, until 12 o'clock noon Central Standard time, Saturday, July 9th, 1921, for furnishing labor and materials for the isntallation of a system of Sanitary Sewerage consisting of about 15 miles of vitrified pipe, according to plans and specifications prepared by Cellarius & Dressler, Engineers, Commercial Building, Dayton, Ohio.

Plans, specifications and uniform bidding blanks on file at the office of the Clerk of said Village, and the above Engineers.

WM. R. HUGHES, Mayor.
CHAS. H. PANSING, Clerk.

Bids: July 5.

Sewer Construction

Larchmont, N. Y.

Proposals for construction of sewers, also construction of house connections for sewer, gas and water, also storm water drains, curbs and gutters, Village of Larchmont, N. Y.

Notice is hereby given, pursuant to Section 266 of the Village Law, that the Board of Trustees of the Village of Larchmont, in the County of Westchester, State of New York, will on the 5th day of July, 1921, at 8:30 o'clock p.m., at the Village Hall, in said village, receive sealed proposals for the construction of sewers (this bid to be a separate bid), also a second bid for construction of house connection for sewer, gas and water, a third bid for storm water drains with appurtenances, curbs and gutters, these improvements in accordance with the statue were authorized at the Special Election of said Village on March 22, 1921.

Conditions under which all said proposals shall be made, the specifications, plans and detail drawings for the construction of said improvements and the form of contract under which the same is proposed to be constructed may be inspected and obtained on business days at the office of L. E. Van Etten, Village Engineer, No. 12 Lawton Street, New Rochelle, N. Y., commencing Wednesday, June 22, 1921. Hours 9 to 4 o'clock Saturday noon.

A deposit of $1,000 by certified check to the order of the Village Treasurer will be required to accompany each of the three bids, in accordance with the statue.

The Board of Trustees may accept or reject any proposal or may contract with other than the lowest bidder or may reject all proposals and advertise again.

By order of the Board of Trustees of the Village of Larchmont, N. Y.

EDWARD C. GRIFFIN, President.
EUGENE D. WAKEMAN, Clerk.
Dated: Larchmont, N. Y., June 16, 1921.

Bids: July 15.

Storage Reservoir

Ilion, N. Y.

Sealed proposals will be received by the Board of Water Commissioners of Ilion, N. Y., at 1 p.m., Standard Time, July 15, 1921, for improvements to the water-works of Ilion, N. Y. Proposals are solicited upon any or all of the contracts.

(1) Earthen Dam, Spillway and appurtenances, and laying pipe.

(2) Furnishing and delivering Cast Iron Pipe and Specials.

Note—Contract No. 1 includes about 80,000 yds. of Earth Embankment, about 6,000 yds. of Concrete and the laying of about 6,000 ft. of 10 in. pipe.

Contract No. 2 includes the furnishing of about 300 tons of 10-in., 24-in. and 36-in. pipe.

Each bid must be accompanied by a certified check for 5 per cent of the bid, payable to the Board of Water Commissioners, Ilion, N. Y. Copies of plans and specifications may be secured from the Clerk of the Water Board at Ilion, N .Y., or from James P. Wells, Hydraulic Engineer, Cutler Bldg., Rochester, N. Y. A deposit of $10 must be made for the plans and specifications, which will be returned upon the return of the same in good condition. Right is reserved to reject any or all bids.

(Signed) GEORGE RASBACH,
Clerk, Board of Water Commissioners, Ilion, N. Y

Bids: July 11.

Sewage Treatment Plant

Mamaroneck, N. Y.

Notice is hereby given that sealed bids will be received by the Board of Sewer Commissioners of Sewer District No. 1 of the Town of Mamaroneck, N. Y., until 7:30 o'clock, p.m., Eastern Standard Time, on July 11, 1921, at the office of the Town Clerk, 8 Elm Street, Mamaroneck, N. Y., for furnishing materials and performing the labor required for constructing a sewage treatment plant, including the furnishing and installing of equipment, piping and wiring, furnishing and installing sludge pump and motor, and for constructing an outfall sewer from the sewage treatment plant to an outlet in Larchmont Harbor, all in accordance with plans and specifications on file in the office of the Town Clerk, Town of Mamaroneck, 8 Elm Street, Village of Mamaroneck, New York, and also in the office of the Consulting Engineers, Nicholas S. Hill, Jr., and S. F. Ferguson, 112 East 19th Street, New York City.

Copies of the plans and specifications may be obtained from either the Town Clerk or from the Consulting Engineers upon depositing twenty-five dollars ($25), which sum will be refunded upon the return of the plans and specifications in good condition within ten days after the award of the contract, or else the entire deposit will be forfeited.

By order of the Board of Sewer Commissioners of Sewer District No. 1 of the Town of Mamaroneck.

Dated Mamaroneck, N. Y., June 21, 1921.

H. R. MITCHELL,
Secretary.

Bids: July 13.

Hydro-Electric Power Plant

Traverse City, Mich.

Sealed lump sum bids will be received by O. C. Moffatt, City Clerk, Traverse City, Mich., up to 3 p.m., July 13th, 1921, for furnishing certain material and labor for the construction of a hydro-electric power plant about thirteen miles from Traverse City. The dam will be about 1,600 ft. long and comprises about 130,000 cu.yds. compacted earth fill, and 2,200 cu.yds. concrete, mostly reinforced. Owners will furnish all equipment and structural steel.

Each bid shall be accompanied by a certified check, payable to the City of Traverse City, in the amount of $3,000, as a guarantee that the bidder will, if awarded the contract, enter into contract for said work and furnish bond satisfactory to the city for $50,000 to insure compliance with the terms of the contract.

Plans and specifications can be obtained from Fargo Engineering Company, Jackson, Mich., by depositing $10, which will be returned to bidders upon return of plans and specifications in good condition within fifteen days from date of opening bids.

The City reserves the right to reject any or all bids, and to accept any bid which in its judgment is for the best interest of the city.

O. C. MOFFATT,
City Clerk.

Bids: July 9.

Water Supply System

High Point, N. J.

Sealed proposals will be received by the Mayor and Council of the Borough of Harvey Cedars, Ocean County, New Jersey, at the Council Chamber of the Borough at High Point, in said Borough, at 8 p.m., July 9th, 1921, for the purpose of providing, installing and the furnishing of material, machinery and labor, and all appliances necessary for the construction of a water supply to be drawn from Artesian Wells for the use of said Borough.

Copy of specifications can be seen at the office of the Borough Clerk, High Point, or the same can be examined at the office of George Pfeiffer, Jr., 209 Market Street, Camden, New Jersey. Each bid must be accompanied by a certified check for two hundred dollars, the same to be drawn to the order of the Treasurer of the Borough of Harvey Cedars, New Jersey, as a guarantee that the bidder, if his bid be accepted, will enter into a contract in accordance with his bid and execute the required bond.

The Borough reserves the right to reject any or all bids.

Address all bids to J. B. KINSEY, Mayor, High Point, Ocean County, New Jersey.

Bids: July 16.

Steel and Concrete Bridge Work Rebuilding of Amoskeag Bridge

Manchester, N. H

Sealed bids for the rebuilding of Amoskeag Bridge over the Merrimac River and the Boston and Maine Railroad, in the City of Manchester, N. H., including a complete new superstructure, additions and repairs to the existing substructure and certain approach work, will be received by the Surveyor of the Department of Highways of said City at his office in City Hall until 12 o'clock noon (Eastern Standard Time), on Saturday, July 16, 1921, at which time and place the bids will be publicly opened and read aloud.

The bridge, which will be approximately 750 feet in length, will consist of four spans of through steel trusses, three steel plate girder spans and one steel beam span. It will have one readway 20 feet wide in the clear between curbs and one 6-foot sidewalk, with concrete deck, bituminous macadam pavement in the roadway and granolithic sidewalk.

Each bid must be accompanied by a properly certified check for ten thousand (10,000) dollars. A bond in the sum of fifty thousand (50,000) dollars of an approved surety company will be required for the faithful performance of the contract.

A more complete description of the work to be done is given in Notice to Bidders. Forms of Bid, Contract, Bond, the Specifications and the Contract Drawings accompany the same.

Copies of the foregoing may be inspected at the office of the Commissioners, Department of Highways, at said Manchester, and may be obtained from the engineers, Fay, Spofford & Thorndike, 15 Beacon Street, Boston, Mass., on and after July 1, 1921, by payment of a twenty-five (25) dollar deposit.

Receipt of bids will be subject to the conditions stated in said Notice to Bidders.

The right is reserved to reject any or all bids.

DANIEL F. CRONIN,
Surveyor of the Departent of Highways.
JAMES A. WELLMAN,
JOSEPH QUIRIN,
L. J. FARRELL,
Commissioners, Department of Highways for the City of Manchester, N. H.

FAY, SPOFFORD & THORNDIKE,
Engineers, 15 Beacon Street,
Boston, Massachusetts.
June 30, 1921.

Bids: July 11.

Sale of Warrants

Kissimmee, Fla.

Notice is hereby given that bids will be received by the Board of County Commissioners of Osceola County, Florida, up to and including 10 a.m. on Monday July 11, 1921, at the office of the Clerk of the Circuit Court of said County, at Kissimmee, Florida, for the purchase of one hundred thirty thousand dollars, ($130,000.00), six per cent serial time warrants.

Full information in regard to said Warrants may be obtained at the office of the Clerk of the Circuit Court of Osceola County, Florida, at Kissimmee, Florida.

Certified check in the amount of $3,000.00 must accompany each bid.

Rights are reserved to reject any and all bids.

J. L. OVERSTREET,
Clerk of the Board of County Commissioners of Osceola County.

Bids: July 8.

Construction of Pavement

Ilion, N. Y.

Sealed proposals for the construction of about 6,900 square yards of reinforced concrete pavement, including the necessary curbing, catch basins, tile, and excavation, will be received by the Board of Trustees and the Board of Street Commissioners at their rooms in the Village Hall on Union Street, Ilion, N. Y., until 4 p.m., Friday, July 8th, 1921.

Plans may be seen and specifications obtained at the office of Shirley Squire, Village Engineer, 21 Remington Ave., or at the Village Hall. A certified check for $500 must accompany each bid. The Board reserves the right to reject any or all bids

ROSCOE H. WHITER, President.
SANGER M. HUBBARD, Clerk.
June 23, 1921.

OFFICIAL PROPOSALS

Bids: July 14.

Bridge Construction

BUREAU OF SURVEYS
DEPARTMENT OF PUBLIC WORKS
Philadelphia, Pa.

Sealed proposals will be received at Room 216, City Hall, until 12 o'clock noon on Thursday, July 14, 1921, and opened at that time in Room 216, City Hall for Schedule "B" Bridge, on line of South Street over the Schuylkill River.

PROJECT: The present project is to entirely remove between shore abutments the old bridge on line of South Street across the Schuylkill River, including the three old river piers, to dredge the new channel, to construct the foundations for two new bascule piers, and to construct the foundations and complete two new intermediate piers.

PRESENT BRIDGE: The present bridge on line of South Street comprises 3 through pin-connected iron truss spans, erected in about 1878 (both the piers and trusses were reinforced in about 1895). The central span is a rim-bearing swing span, hand operated, 198 feet center to center of rest piers and 37 feet 6 inches between railings. The two flanking spans are each 189 feet from center of rest pier to face of abutment and 52 feet 2 inches between railings.

The pivot pier is a braced cluster of 9 concrete filled iron plate, circular caissons, originally carried to rock by pneumatic process. Each rest pier is a braced pair of 2 similar caissons. The 3 piers are protected by fenders of piling, timber bracing, walling and masonry.

PLANS AND SPECIFICATIONS: Plans and specifications are on exhibition at Room 416, City Hall, Philadelphia, and at the offices of "Engineering News-Record," New York City, and "Engineering and Contracting," Chicago, Ill. They will be sent to prospective bidders on receipt of certified check for $10, which will be returned when the plans and specifications are returned. Make inquiries in person at Room 746, City Hall, or by mail to the undersigned.

CHARLES FROMMER,
Acting Chief Engineer,
412 City Hall, Philadelphia.
FRANK H. CRAVEN,
Director.

Inquire at Room 746, City Hall.

Bids: July 14.

Resurfacing Street Pavements

Easton, Md.

Sealed proposals will be received by the Mayor and Council of Easton, at the office of the Town Clerk, Easton, Maryland, at one-thirty (1:30) o'clock p.m. (Standard Time), on Thursday, July 14, 1921, at which time and place the proposals will be publicly opened and read.

The work to be done consists of the resurfacing of about thirty thousand (30,000) square yards of existing "Topeka" street pavements.

Forms of Contract, Specifications and Proposal Blank may be obtained from the Town Engineer, Easton Maryland. A certified check for seventy-five dollars ($75) must accompany each proposal. Checks of unsuccessful bidders will be returned within ten days of opening of bids.

JAMES B. BROWN,
Town Clerk.

E. G. KASTENHUBER, JR.,
Town Engineer.

U. S. GOVERNMENT

Bids: July 22.

PROPOSAL FOR STERN-WHEEL STEEL TOWBOAT.—Office Third Mississippi River District, P. O. Box 404, Vicksburg, Miss.—Sealed proposals will be received here untill 11 a.m., July 22, 1921, and then opened, for furnishing one stern-wheel steel towboat. Further information on application.

Nation-wide Publicity

reaches the greatest number of responsible bidders best fitted to do work in the most up-to-the-minute manner at lowest cost.

Official Proposal Columns of Engineering News-Record provide national publicity

OFFICIAL PROPOSALS

Bids: July 14.

Paving

City of Sturgis, Michigan.

Sealed bids will be received until noon, July 14th, 1921, for paving city streets with concrete. The following are approximate quantities of work:

5,200 cu.yds. of grading.
14,000 ft. combined curb and 18" gutter.
18,000 sq.yds. of 7" concrete (part plain, part reinforced).

Estimated cost of this work, $70,000. (Other work expected to be let this year.)

Plans, specifications and bidding blanks can be obtained from the undersigned by depositing $5.00, which will be refunded, when plans are returned at the time bids are received.

No bid will be considered unless accompanied by a certified check for $1,000.00 drawn to the order of the City Treasurer, City of Sturgis.

The City Commission reserves the right to reject any or all bids.

R. D. BALLEW,
City Manager.

U. S. GOVERNMENT

Bids: July 27.

U. S. ENGINEER OFFICE, WHEELING, W. VA.—Sealed proposals will be received here until 11 a.m. (Eastern Time) July 27, 1921, and then opened, for constructing two two-story, twelve-room lockkeepers' double houses at each of Dams Nos. 14 and 26, Ohio River. Further information on application.

Bids: July 25.

U. S. ENGINEER OFFICE, Pittsburgh, Pa. Sealed proposals will be received here until 12 noon (Eastern time) July 25, 1921, and then opened, for furnishing and delivering lock valves for Lock No. 5, Allegheny River. Further information on application.

Bids: July 25.

U. S. ENGINEER OFFICE, Galveston, Texas. Sealed proposals will be received here until 12 M. July 25, 1921, and then opened, for constructing submerged riprap spurs from North Jetty at Port Arkansas, Texas. Further information on application.

Notice to Advertisers

Owing to the holiday,

JULY 4th

the "Searchlight" pages of the July 7th issue will close for press earlier than usual. Copy for this issue should reach us by 11 A.M., Friday

JULY 1st

Fiddling on One String

¶Paganini, that wizard of the violin, was able to get seven octaves on one string—a real achievement. He fiddled on one string until he was able to do something no one had ever done before. He got the very most out of that one string that there was in it. ¶That is the Swart idea on Contract Bonds. SWART has fiddled on that one string until SWART SERVICE has reached the point where all seven octaves are played—there is nothing left undone. ¶The contractor with the SWART-executed Contract Bond knows that he is completely and properly covered and that his interests have been looked after in every possible way. ¶He knows that SWART will keep posted on the progress of the work and with this information to pass on, will keep the underwriter thoroughly sold on the contractor. ¶Worth more? Certainly. Cost more? Certainly not. A rare bargain.

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HARTFORD, CONN. AGENTS EVERYWHERE

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

MECHANICAL engineer wanted, Water Department, City of Baltimore; salary $3,500. For application blank and information regarding tests address City Service Commission, Baltimore, Md.

WANTED—An instructor in civil engineering subjects by correspondence; must be a college graduate with some practical experience; position requires residence in an eastern city of 150,000; state education and experience, also initial salary expected in first letter; New York or Philadelphia interview. P-796, Eng. News-Record.

SALES engineer wanted. Nature of work promotional. Experienced in highway construction, particularly concrete. Must be graduate engineer with promotional ability and experienced in addressing public gatherings. Give qualifications and salary expected. P-838, Eng. News-Record, Old Colony Bldg., Chicago, Ill.

EMPLOYMENT AGENCIES

SEVERAL experienced teachers and instructors in technology and sciences; also recent graduates interested in securing teaching positions. Cleveland Engineering Agency. Rose Bldg., Cleveland, Ohio.

EMPLOYMENT SERVICE

$3,000 to $30,000—Dignified, tactful placement service for professional adminstrative and technical executives. Candidates must have earning capacity exceeding $3,000. Correspondence invited. Negotiations strictly confidential. Charles Clark, P. O. Box 141, Newark, N. J.

EXECUTIVE qualified for salaries of $2,500 to $25,000 and upward are invited to communicate in strict confidence with the undersigned, who will conduct preliminary negotiations for such positions. The procedure used is peculiar to this servce, differing essentially from all others, and is constructive and initiative; applied indivdually, and in no way jeopardizing present connections. Established 1910. Send name and address only for particulars. R. W. Bixby, Inc., 304 Lockwood Building, Buffalo, New York.

POSITIONS WANTED

Mechanical and Electrical

MECHANICAL engineer, age 35, single, knowledge of building construction, reinforced concrete, track and highway building and maintenance, desires position with construction company, salary reasonable, location immaterial. Interview desired. PW-818, Eng. News-Record.

MECHANICAL or works engineer; eleven years' experience in paper mills; steel sash, auto spring and factory truck manufacturing. Supervision of power, maintenance, construction and manufacturing. Some sales experience. Now available for any work where such experience would be of value to employer. Age, 34; married. Cornell graduate. PW-839, Eng. News-Record.

Civil Engineer

CIVIL engineer (Assoc. Mem. Am. Soc. C. E.), age 35, ten years responsible charge tropical and Latin-American work, railroad location and construction, harbor public utilities, plantation and oil fields, operation, construction and development; fluent Spanish; highest credentials; will go anywhere. PW-765, Eng. News-Record.

CIVIL engineer graduate, draftsman, field and office work, inspector, estimator, desires position in New York City, age 29, single. PW-788, Eng. News-Record.

CIVIL engineer desires responsible position with opportunity to show results and build a permanent future. Graduate civil engineer, Member American Society of Civil Engineers, married, 35 years of age. Broad engineering and business experience. Capable executive. PW-786, Eng. News-Record.

CIVIL engineer, graduate, fifteen years' practical experience with engineers and contractors; water works, sewers, highways, general municipal, hydraulic and utility engineering; reports, design, construction, appraisals. Excellent references. Monthly or per diem basis. PW-750, Eng. News-Record.

CIVIL engineer, age 35, fifteen years' experience, 10 years responsible charge railroad, highway, concrete and other construction; chief of party on location and other surveys; reports, plans, estimates and other office work; desires position, preferably with contracting or engineering firm. PW-740, Eng. News-Record, Old Colony Bldg., Chicago.

CIVIL engineer, graduate, five years railroad, maintenance and construction, heavy excavation, concrete, sewers, surveys, available. PW-397, Eng. News-Record, Old Colony Bldg., Chicago.

CIVIL engineer, graduate; 11 years' designing, estimating steel, concrete buildings, industrial plants; general construction. PW-807, Eng. News-Record.

CIVIL engineer, university graduate; age 23; desires position with engineering or contracting firm; location immaterial. PW-819, Eng. News-Record.

CIVIL engineer, graduate, age 26, four years' experience railroad construction and maintenance, desires position with consulting engineer; willing to start at bottom. A. S. Lahn, Box 137, Westerly, Rhode Island.

CIVIL engineer; recent university graduate; desires position with firm of engineers or contractors; experienced in building construction, surveying, drafting, estimating, inspection, sewer and water line designs. Available immediately. PW-834, Eng. News-Record, 935 Real Estate Trust Bldg., Phila., Pa.

CIVIL engineers available; two engineers, with complete equipment; 17 years' municipal, highway and drainage work. Available on short notice. Gilcrest & Blechele, 427 McKinley Ave. N. W., Canton, Ohio.

CIVIL engineer, 26, single, over five year's field and office, structural and concrete design, industrial and highway experience, desires any connection in which ambition and energy will count. East preferred but not essential. PW-832, Eng. News-Record.

CIVIL engineer, graduate, thirteen years' broad experience, design and construction, docks, sewers, subways, power and industrial plants, hydro-electric developments. PW-729, Eng. News-Record.

GRADUATE, civil engineer, age 27, single, four years' experience railroad valuation, railroad maintenance of way and mine surveying, desires position; salary no object if work permanent. PW-821, Eng. News-Record, Real Estate Trust Bldg., Philadelphia.

EXECUTIVES

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All correspondence confidentially treated

POSITIONS WANTED

GRADUATE civil engineer (Toronto University, 1921), age 25, desires to locate with consulting or contracting engineering firm. Four years' experience on structural steel work of all kinds. Good draftsman. Can start work immediately. State salary offered and what prospects. PW-810, Eng. News-Record.

GRADUATE civil engineer, single, College experience, desires position in New York City or vicinity. Field work preferred, with opportunity for advancement. Available any time. PW-808, Eng. News-Record.

GRADUATE in civil engineering, M. I. T. 1921, age 22, experienced surveyor, would like position, character and place of work immaterial. Available immediately. PW-826, Eng. News-Record.

Surveying

CHAINMAN, accurate chaining, three years' experience in field work. East preferred. PW-793, Eng. News-Record, Real Estate Trust Bldg., Phila.

CIVIL engineer, 36 years old, 14 years' experience survey and construction work, desires employment as chief party location survey or as engineer in charge construction work. Speak Spanish. Will go anywhere. Best references. PW 783, Eng. News-Record.

EXPERIENCED topographical and hydraulic survey party, fully equipped, available on short notice. Address Room 5, 44 No. Pearl St., Albany, N. Y.

INSTRUMENTMAN in office of surveyor and engineer by A-1 instrumentman transit or level, understands ordinary computation of and surveys, is conversant with accurate up to date methods, best references; moderate salary. PW-827, Eng. News-Record.

Bridge and Structural

CAREFUL experienced structural and mechanical engineer desires employment. R. Berggren, 155 W. 75 St., New York City.

STRUCTURAL draftsman, experienced designer, checker and estimator, bridges and industrial buildings, desires position. Preferably in or near Philadelphia. PW-603, Eng. News-Record, Real Estate Trust Bldg., Phila.

STRUCTURAL detailer job wanted anywhere in Spanish America by ambitious young man knowing Spanish. Experience; references. Available now. Salary $125 to $150 monthly. Pay own traveling expenses. PW-825, Eng. News-Record.

STRUCTURAL steel detailer wanted, experienced on mill buildings and bridge work. St. Louis Structural Steel Co., St. Louis, Mo.

STRUCTURAL engineer, designer, estimator and chief draftsman; technical graduate; seven years' experience with high-grade firms; specialized reinforced concrete, industrial plants and buildings; also steel and mill buildings, layouts, equipments, installations; field or office; New York City and vicinity. PW-656, Eng. News-Record.

Drafting and Designing

CHIEF draftsman, 12 years' experience steel plate and frame construction, oil refineries and mining; 6 years in South America. Location immaterial. PW-836, Eng. News-Record, 935 Real Estate Trust Bldg., Phila., Pa.

DESIGNING engineer, graduate, 14 years' experience. Specialty reinforced concrete buildings, foundations, bridges, and all types of hydraulic structures. Also general design, hydraulic investigations, layouts, estimates, and reports. PW-753, Eng. News-Record.

DRAFTSMAN; fifteen years' experience as mechanical, structural, steel car construction and irrigation engineering. Inspection or outside work. Personal interview or correspondence solicited. PW-829, Eng. News-Record.

POSITIONS WANTED

DRAFTSMAN—Position desired by man age 28, single; three years' experience, office and field. Prefers permanent position; would like to specialize. Would start as tracer or checker. Neat, accurate, conscientious work. Would like to hear from bridge or ship building corporation. Consider any position of permanent nature. Address Fred M. Garnett, 411 Telfair St., Augusta, Ga.

Superintendents

CONSTRUCTION superintendent and engineer, 37; 15 years' experience in construction work on roads, sewers, foundations, buildings, and bridges; reinforced concrete a specialty; good estimator and organizer. PW-820, Eng. News-Record, Old Colony Bldg., Chicago.

CONSTRUCTION superintendent, experienced carpenter by trade, 37 years of age, twelve years as superintendent with last contractor, specialized on industrial buildings; can handle all branches of construction and furnish A-1 reference. Good executive and get good results; location immaterial. Address Supt., 139 Cedar Street, Springfield, Mass.

POSITIONS WANTED

ENGINEER-superintendent having experience in the design, construction and maintenance of a broad line of floating equipment and shore plant, desires position. New York district preferred. Now engaged. PW-734, Eng. News-Record, New York.

HIGHWAY superintendent, thoroughly experienced with all types of road construction; seven years' experience; first class references. PW-805, Eng. News-Record.

SUPERINTENDENT or general foreman, thoroughly experienced on all kinds and classes of work. Location immaterial. PW-814, Eng. News-Record.

SUPERINTENDENT at present employed, desires change. Twenty-five years' experience in following lines, highways, concrete and bituminous paving, sewers, water pipe, steam shovel and pile driving, concrete in all its branches. A hustler and first class organizer. Reference past and present employers. Moderate salary. PW-795, Eng. News-Record.

SUPERINTENDENT, general foreman, state road builder, broad experience, all around road contractor's man; available one week. PW-778, Eng. News-Record.

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POSITIONS WANTED

Miscellaneous

CHIEF or assistant chief engineer, wide experience in design and installation of mechanical, electrical and chemical equipment, fuel economy and power house design. Good executive, technical and practical with European and Canadian experience. PW-608, Eng. News-Record.

CONSTRUCTION engineer and superintendent, graduate mechanical engineer, age 37, fifteen years with firm contracting engineers, experience all branches of construction handling, Government, State, industrial and highway contracts, good executive and get results. Location New York, Pennsylvania, New Jersey. PW-589, Eng. News-Record.

ENGINEER just returned from France; age 37; seventeen years' railway location; construction valuation. Five years on Panama Canal; two years Captain Engineers in France. Fluent Spanish and French. Desire immediate engagement. PW-835, Eng. News-Record.

ENGINEER, Am. Soc. C. E. River and harbor improvement experience, examinations, reports and supervision. Reference to present work. PW-756, Eng. News-Record.

ENGINEER, broad mechanical and construction experience with knowledge of buildings, manufacturers' hazards, desires position as plant or safety engineer; New York references. **PW-840, Eng. News-Record.**

EXPERIENCED reinforced concrete engineer, architectural ability, open for engagement; moderate salary. **Boyd, 170** W. 77th St., New York City.

FIRE brick mason and expert furnace builder with technical and practical experience in building furnaces for the ceramic, chemical enameling, porcelain, glass, iron and steel industries. A 30% fuel saving of each furnace is guaranteed. Eugene Wuerz, 158 East 124 St., New York.

GRADUATE C. E. (32), ten years' experience in reniforced concrete and building work. Executive with ability to estimate, secure and handle contracts, desires permanent connection. PW-731, Eng. News-Record, Leader-News Bldg., Cleveland.

MANAGER of large land, water and irrigation project; technical engineer, familiar with all construction work connected with large projects as building dams, irrigation canals, etc., is open to engagement as manager of similar project. PW-806, Eng. News-Record, Rialto Bldg., San Francisco.

MARRIED man, 30 years of age. Have had executive experience for nine years. Had charge of estimating department for one of the largest corporations in the country for four years. Am a good and reliable estimator on buildings, water work, piers, etc. Can furnish best of reference. PW-812, Eng. News-Record, **935** Real Estate Trust Bldg., Phila.

PROFESSORSHIP

Liberal Arts and technical graduate with Master's degree, M. Am. Soc. C. E., 16 years' engineering experience, desires position teaching civil engineering lines, or kindred educational work.

PW830—Engr. News-Record
1570 Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

PROFESSOR of civil engineering; over nine years' successful teaching experience and eight years' practical experience in highway, sewer, bridge, trolley and building construction. Desire position as Prof. or Asst. Prof. in College of high grade. PW-824, Eng. News-Record, Real Estate Trust Bldg., Phila.

YOUNG man seeks opening with contractor in road building, irrigation projects or with consulting engineer, assistant or minor position until efficient enough to take charge, financial interest if possible; best references, Assoc. Mem. A.S.M.E. E. Gunther, 1920 East 17th St., Oakland, Calif.

YOUNG man, technical education, with years of valuable field experience, desires position with engineering or contracting firm; will start anywhere; location immaterial. Theodore F. Weiss, 1078 Longfellow Avenue, New York City.

YOUNG man desires position with construction company or one leading to sales work. Two years' experience in drafting and reinforced concrete building design. Graduate, architectural engineering, age 28. Moderate salary to start where there is opportunity for advancement. R. E. Price, 926 7th Ave., Huntington, West Virginia.

EXTRA WORK WANTED

DRAFTSMAN, mechanical, desires extra work. General plant layout experience. J. Hesse, 30 E. 42d Street, Room 727, New York City.

ENGINEERS desire farm subdivisions, layouts, excavations, and any work, relative to topographic and city surveying. XWW-817, Eng. News-Record.

SPARE TIME WORK WANTED

DRAFTSMAN wants work from machine shops. Address H. L. Hickman, Covington, Ohio. RR No. 1 Box 4.

WHY employ a permanent draftsman, when your work does not require one? Drawing Service will work out your ideas, designing, detailing, tracing, blanking, forming, and drawing dies, tools, special machinery, patent office work a specialty. Rates reasonable, contract or hourly. WW-749, Eng. News-Record.

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Shop—Drawing

Steel detailing and checking done by professional structural draftsmen and checkers, get our prices and terms, they will please you. Bambach & Doerr, 28 E. Jackson Blvd., Chicago.

SALESMEN AVAILABLE

EXECUTIVE of 37 years of age, possessing good sound business judgement and considerable experience, solicits negotiations with those desiring high grade representation in Cincinnati territory. AS-695, Eng. News-Record, Old Colony Bldg., Chicago.

SALESMAN, experienced small contractor's equipment, at present with dealers, desires position with manufacturer, selling either through agents or direct to users; thoroughly familiar with jobbing phase of selling; available July 1. AS-776, Eng. News-Record, Leader-News Bldg., Cleveland.

SALESMAN, young, experienced, desires to represent manufacturer of contractor's equipment; territory Indiana, Ohio or Michigan; will consider either direct representation or acting as agent for any first-class line. AS-777, Eng. News-Record, Leader-News Bldg., Cleveland.

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Able and active sales representatives wanted throughout the States to handle a line of pneumatic pressure systems, deep well, condensation and centrifugal pumping machinery. Company established many years has complete manufacturing plant and many thousands of pumps in operation. An excellent opportunity for a number of capable representatives. AS-802, Eng. News-Record.

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160 pieces 20 ft., 80 pieces 35 ft. Could use some longer lengths. Box W-785, Eng. News-Record, Old Colony Bldg., Chicago.

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Generators

1—150 hp. belt driven generator, 3 phase, 60 cycle, 2,300-volt, a.c. 1—220-volt generator, d.c. 1—440-volt generator, d.c. Rockville Granite Company, Cold Springs, Minn.

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Plan file, all steel, holds hundreds of plans hanging, hundreds in troughs; worth $450, sell $175. Architect, Room 409, 387 Main St., Springfield, Mass.

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One non-friction roller bearing mechanism, for any weight machinery, 1 best cooking range, 1 best link protractor for drawing work. If interested call for drawings and specifications. Address, J. Sharpe hdqrs. at 13th Engineers Camp Humphreys, Va.

Traction Shovel

Model 28 "Marion" ⅜-yard traction shovel. Mass Standard boiler, 150-lb. pressure used only one contract. Will sell for $5,000 loaded. J. F. Foster, 45, Francisca Ave., W. Somerville, Mass.

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Cotton top and bottom **Mattresses**. Size 3 ft., reclaimed but in good condition. $2.50.
Bed Sacks—Used as mattresses. 85c.
U. S. Navy all wool **Blankets**, white reclaimed. Perfect condition. $4.00.
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Feather **Pillows**, reclaimed. 40c.
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Bunks—Upper and lower sleeping bunks, made of Black Angle Iron, National Spring and Helicals, size 2 ft. 6 in. $4.50.
Bunks—Upper and lower sleeping bunks, continuous posts white enamel, size 3 ft. $5.50.
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1—10 ton Kelly 3 wheeled roller.
1—Austin Cube paver, 2 bag, steam power.

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South Bend, Ind.

REINFORCING BARS

About 80 tons, sizes ⅝ in., ¾ in., ⅞ in., 1 in. and 1⅛ in. square twisted and deformed new billet bars in good condition. Lengths about 35 ft. Price in lots of 18 tons or more $1.75 per cu. ft. f. o. b. Philadelphia.

CHARLES M. DILL
Land Title Bldg., Philadelphia

CRANE

1—Rebuilt Model "D" 20-ton capacity "OHIO" Locomotive Crane equipped with double drums and 50 ft. boom. Excellent buy. Immediate delivery.

WIRE *PHONE* *WRITE*

TITAN EQUIPMENT COMPANY
30 Church Street, New York

FOR SALE OR RENT
in New York Harbor

FLOATING STEAM DIGGER AND DERRICK

with Clamshell or Orange Peel bucket attached.

McGirr Stevedore & Auto Trucking Co.
234 W. 34th St., New York City.

EXCAVATION

Steam Shovels for rent with crews or work taken by contract.
Dinkeys and cars or teams furnished.

H. C. AMBLER
3717 Old York Road, Philadelphia, Pa.

FOR RENT OR SALE

No. O. AUSTIN TRENCHER
NO. 1-52 AUSTIN TRENCHER

R. L. OAKLEY
521 Detroit Savings Bank Bldg.
Detroit, Michigan

FOR RENT

KEYSTONE EXCAVATORS

For Grading or Ditching—With Crew.
Model 3—Available about July 1st
Model 4—Available about July 1st

F. D. LEFFINGWELL
Montclair, N. J.

WANTED TO RENT

2—24 in. gauge gasoline

LOCOMOTIVES

six to eight months, quote rental and sale price and location for inspection, first letter.

THE FRED R. JONES CO.
111 W. Washington St., Chicago, Ill.

FOR RENT

No. 0 Austin Trencher

W. G. FRITZ CO., Inc.
West Orange, New Jersey

TO RENT

KEYSTONE EXCAVATOR

New machine equipped with Skinner scoop, Ditcher scoop, crane attachment. Mass. Standard boiler. Experienced crew.

HENRY R. SOMES
343 Bay St., Springfield, Mass.

"Opportunity" Advertising:

Think
"SEARCHLIGHT"
First!

0099

Construction Equipment Wanted

voltages as specified except that if necessary 2200 volt or 550 motor drive will be accepted with or without motors. Complete Price, availability and location is desired on equipment described below. Must be in first class operating condition and subject to inspection before acceptance or shipment. Alternative proposition on equipment of approximate size or description will be entertained. Motor volts (3 phase, 60 cycle) will be considered. Quotations involving and specific information should be furnished in every instance.

Item No.	Unit	Description
1	1	Jaw Crusher, fitted with manganese steel jaw plates, size 60 in. x 48 in.
2	2	Gyratory Rock Crushers, size No. 6, fitted with manganese concaves, straight belt drive, standard discharge.
3	1	Revolving Rock Screen, 72 in. x 18 ft., screen sections 8 feet 3 in., 5 feet 6 in. and 5 feet 8½ in.
4	1	Sand Roll, 42 in. x 16 in. with corrugated shells
5	2	Sand Rolls, 36 in. x 16 in., fitted with smooth shells.
6	1	Belt Conveyor, 42 in. belt, 48 ft. center to center, troughed belt-geared head with driving pulley.
7	1	Belt Conveyor, 36 in. belt, 108 ft. center to center, troughed belt geared head with driving pulley.
8	1	Belt Conveyor, 18 in. belt, 22 ft. center to center, troughed belt-geared head with driving pulley.
9	1	Belt Conveyor, 16 in. belt, 38 ft. center to center, troughed belt-geared head with driving pulley.
10	1	Stone Elevator, belt type, width of belt 14 in.—42 ft. centers, geared head with driving pulley.
11	2	Revolving Rock Screens, 60 in. x 12 ft. with 3 in. perforations and sand jacket of 2 mesh wire cloth 10 ft. long.
12	1	Apron Feeder, 18 in. width. Reference—page 421 Link Belt Co. Cat. No. 300.
13	2	Rotary Feeder, 10 in. diameter by 15 in. lengths, reference page 62, Cat. No. 42 Webster Mfg. Co.
14	1	Concrete Mixer, capacity 2 cu. yd., Ransome mixer No. 56-S preferred. Batch Hopper. Gearing for motor drive. No motor.
15	1	2-6-2 or 0-6-0 saddle tank steam locomotive, standard gauge, 16 in. x 24 in. cylinders. Wt. 55 to 60 tons, Air brakes.
16	1	14 in. x 22 in. or 15 in. x 20 in. four wheel saddle tank steam locomotive—standard gauge, weight 40 tons, air brakes.
17	5	11 in. x 16 in. four wheel saddle tank steam locomotive, Standard Gauge, weight about 20 tons, steam brakes.
18	1	Locomotive Crane. 50 foot boom, capacity 20 tons at 12 foot radius.
19	1	Clam shell Bucket. 1 cu. yd. capacity, equal to the Lakewood Equipment Co. 2 line handler bucket with ⅜ in. shell.
20	20	Dump Cars, 6 or 7 cu. yd. 2 way side dump, 4 wheel, Reference Page 391, Western Wheeled Scraper Co. Cat. No. 50—Standard gauge.
21	12	Flat Cars—36 ft. 60,000 lb. capacity, M. C. B. Equipment.
22	1	Combination passenger and express car—light weight, M. C. B. Equipment.
23	2	Push Cars, Standard Gauge, 20 in. wheels, 2 in. axle, equal to the Buda No. 6½ car.
24	2	Sections Cars, motor driven, standard gauge.
25	1	Track Laying Car, extra heavy, capacity 15 tons, Standard Gauge
26	20	Cars, steel rocker dump type, 30 in. gauge, 1½ cu. yd. capacity.
27	1	Air Compressor, portable, gasoline engine driven, piston displacement, approv. 210 cu. ft. per min. to 100 lb. pressure—mounted on team truck similar to the Ingersoll-Rand "Imperial."
28	1	Rock Drill Sharpener—equal to the Leyner No. 50 made by the Ingersoll-Rand Co. or Sullivan Machinery Co., standard sharpener, with equipment for shanking and sharpening ⅞ in. and 1 in. hollow hexagon steel with 4 point cross bits.
29	1	Steam Shovel, revolving type on crawling tracks, weight about 25 tons—⅜ cu. yd. dipper.
30	1	Railroad type electric shovel, 80 to 85 tons. Equipped with 2½ cu. yd. dipper, driven by 3 phase, 60 cycle, 550 volt motors.
31	3 sets	14 in. Guy Derrick Irons; one with 12 ft. bull wheel and 2 without bull wheels.
32	2	8¼ in. x 10 in. d.c., d.d. skeleton hoist engine with swing ing engine.
33	1	7 in. x 10 in. 3 drum skeleton hoist with swinging engine.
34	2	Air Compressors, each with capacity of 1,300 cu. ft. per minute piston displacement to 100 lb. pressure, short belt drive by motor or direct connected to 3 phase, 60 cycle, 2,200 volt motors.
35	7	Steel Guy Derricks, 100 ft. boom, 110 ft. to 115 ft. mast, with 20-ft. bull wheels, 15 ton capacity.
36	7	Hoisting Engines, Electric, 3 drums and swingers, capacity 10,000 lb. on single line at 220 ft. per minute. Motors 3 phase, 60 cycle, 550 volts.
37	25,000 lin. ft.	1 in. Galvanized Derrick Guy Rope, Iron 6 strands of 7 wire to the strand with hemp center, breaking strength 141 tons—⅞ in. may be substituted.
38	20,000 lin. ft.	¾ in. Pliable Extra Quality Plow Steel Grade Hoisting Rope. 8 x 19 construction with hemp center. Breaking strength 22 tons.
39	5,000 lin. ft.	⅝ in. Standard Plow Steel Grade Hoisting Rope 6 x 19 construction.
40	1	Oil Furnace, for heating rock drill steel, equal to the Ingersoll-Rand Leyner No. 24 furnace.
41	1	Portable Steel Forge, 24 in. x 24 in. hearth, 12 in. or 14 in. blower. Equal to the Champion No. 404 or Buffalo No. 600.
42	12	Rock Skips, size 7 ft. x 7 ft. x 30 in.—⅜ in. plate, similar to the Insley Mfg. Co.'s No. 905 Standard cableway skip.
43	13	Concrete Buckets—Capacity 60 cu. ft. two line bottom dump for engine dumping, straight sides.
44	3	30,000 Gal. Wood Stave Water Tanks
45	100	Steel Bunks, 30 in. x 6 ft. 5 in. double.
46	150	Steel Bunks, 36 in. x 6 ft. 5 in. double.
47	50	Steel Bunks, 36 in. x 6 ft. 5 in. single.
48	2	Quarry Drill of the well drill type to drill 5⅝ in. holes, equipped with 15 H.P. 550 volt motors. Non traction. Equal to the Sanderson Cyclone No. 14 Electric non-traction drill.
49	300 ft.	9 in. Spiral steel No. 14 B.W.G. Galvanized Pipe with flanged joints, gaskets and bolts, suitable for working pressure of 150 lb. per sq. in.
50	400 ft.	9 in. Spiral Steel No. 16 B.W.G. Galvanized Pipe with flanged joints, gaskets and bolts suitable for working pressure of 100 lb. per square inch.

DIXIE CONSTRUCTION COMPANY, Verbena, Alabama

CRANES

1—Byers Auto Crane 35 ft. boom, steam driven, caterpillar traction, ¾ yd. clamshell bucket.

1—Little Giant Traction Road Crane, 30 ft. boom, ¾ yd. clamshell bucket, steam driven.

1 Erie Type B 30 ft. boom steam driven, ¾ yd. clamshell bucket, traction.

1—Ray City Motor Traction Crane, 30 ft. steel boom, ¾ yd. clamshell bucket, traction or caterpillar, operated with a Twin City 4 cyl. gasoline motor.

1—15 ton 8 wheel Brown Hoist, 45 ft. boom.

1—20 ton 8 wheel Browning 50 ft. boom.

1—30 ton 8 wheel Browning, 50 ft. boom.

Reading Engineering Co., Inc.
1228 Tribune Bldg., New York City

FOR SALE

1—3-ton Plymouth Gasoline Locomotive. 24 in. gauge, $1350.00 near Philadelphia.

TERWILLIGER EQUIPMENT CO.
2013 Market Street, Phila., Pa.

"DREDGING PUMP" FOR SALE

One No. 10-D Erie Pump & Engine Works Standard Dredging Pump, with suction elbow, pulley, and suction bonnet. 10 in. connections. Used about three months. In good condition.

ROYAL C. WISE
(Pumps for Dredging or Water Supply)
1642, 53 W. Jackson Blvd., Chicago

FOR SALE

Byers Auto Crane C1917
Loco. Crane 20 Ton, 8 wheel, O. & S.

WILSON & CO.
Purch. Dept.
Chicago, Ill.

ROAD ROLLERS

1—10 ton Buffalo Pitts, D. C. 3 wheel steam.

1—10 ton Kelly Springfield, D. C. 3 wheel steam.

1—10 ton, J. I. Case, 3 wheel, steam.

1—10 ton Kelly Springfield, 3 wheel, gasoline.

1—10 ton Austin, 3 wheel, gasoline.

1—10 ton Monarch, 3 wheel, D.C. steam.

1—8 ton Erie tandem.

1—6 ton Tandem Buffalo Pitts.

1—6-ton Iroquois Tandem.

1—5 ton Kelly Springfield, tandem.

1—3 ton Kelly Springfield, tandem.

DRAGLINE

1—Monighan T walker dragline, 50 ft. boom, 1 yd. Page bucket, 3 cyl. oil engine.

INDUSTRIAL OUTFIT

2—Miles 24 in. gauge Koppel track, 20 lb., in 15 ft. sections—7 ties to the section.

40—1½ yd. V-shape Koppel 24 in. gauge Cars.

50—4 yd. two-way Western 36 in. gauge dump cars.

4—36 in. gauge Saddle Tank Locomotives.

STEAM SHOVELS

1—No. 1 Thew Steam Shovel on standard gauge railway wheels, with 1 yd. dipper.

1—Marion Model 28, on traction wheels, with ¾ yd. dipper

1—Bucyrus 14-B Steam Shovel, ¾ yd. dipper, on caterpillar tractors.

MIDWESTERN COMPANY
140 South Dearborn Street, Chicago

WANTED

To get in touch with parties having the following equipment for rent or sale:

1 standard gauge **LOCOMOTIVE** not less than 15 tons. Standard gauge **AIR DUMP CARS**, twelve yard capacity, 30 lb. rail.

Prefer equipment located in Florida, Georgia or Alabama on account of freight.

Southland Steamship Co.
West Palm Beach, Fla.

WANTED

DUMP CARS

50—Western, 4-yd., 36-in. gauge, 2-way, Side Dump Cars, wooden or steel draft beams.

GREY STEEL PRODUCTS COMPANY
111 Broadway, New York City

WANTED

TRAVELING CRANE

Steam or Electric, with 45 to 60-ft. Boom. State price, number, make, condition and age. Cash.

W831—Engineering News-Record
10th Ave. at 36th St., New York City

WANTED

USED ASPHALT PLANT

Either port. Road or railroad type. Must be in good condition. State make, age, capacity, condition, price, location. Address

W833—Engineering News-Record
935 Real Estate Trust Bldg., Phila. Pa.

Letter No. 3

Yes—there is business now for those who go after it!

TELEPHONE RECTOR 5542

GREY STEEL PRODUCTS COMPANY

111 BROADWAY

NEW YORK

June 2, 1921.

Engineering News Record,
10th Ave. & 36th St.,
New York, N. Y.

Gentlemen:

Will you kindly discontinue our advertisement covering the new 50-ton Saddle Tank Locomotive which you have recently been running for us in the Engineering News Record; also our Locomotive Crane advertisement, and inserting the following new copy enclosed.

We are pleased to advise that we have sold the locomotive and crane mentioned as a direct result of this advertising, and needless to say, we are well pleased with the results obtained through our advertising in the Engineering News Record.

Yours very truly,

GREY STEEL PRODUCTS COMPANY,

H. Grey.

HG:E

Enclosure.

N. B.—This is one of a number of similar letters received in the past few weeks.

ENGINEERING NEWS-RECORD
—The Dominant Paper—
Circulation over 30,000 Weekly

0315

Contractors' Equipment

For Your Immediate Service

The majority of the equipment which we sell is thoroughly overhauled in our shops and is guaranteed as to condition and operation

COMPRESSORS

Chicago Pneumatic, portable, gasoline driven, 70 cu. ft.
1—Chicago Pneumatic Fuel Oil Engine, 210 cu. ft.
Curtis, portable, gasoline driven, 125 cu. ft.
McKiernan straight line, 20 x 20 x 24, steam driven, 800 cu. ft.

CRUSHERS

No. 2 Climax, 9 x 16, on wheels.
No. 9 Acme, 10 x 18, on skids.
No. 10-B Farrell, 30 x 13, on skids.
No. 5 McCully Gyratory, manganese.
10 x 16 Buchanan, on wheels with elevator, bin, and screens.

MIXERS

5-S Oshkosh, power loader, gasoline engine.
7-S Knickerbocker, power loader, gasoline engine.
14-S Ransome, low charge hopper, gasoline engine.
27-S Ransome, batch hopper, steam engine.
28-S Rex, batch hopper, 25 hp., D.C. motor.
12-S Ransome, batch hopper, motor drive.
27-S Ransome, batch hopper, motor drive.

LOCOMOTIVES, CARS AND TRACK

1—5 ton Milwaukee, 24 in. gauge.
2—3 ton Plymouths, 24 in. gauge.
2—6 ton Plymouths, 24 in. gauge.
1—3 ton Bell, 24 in. gauge, oil burning.
3—3 ton Plymouths, 36 in. gauge.
1—6 ton Plymouth, 36 in. gauge.
10—1½ yd. V shape dump cars, 24 in. gauge.
20—Batch cars, 24 in. gauge.
43—Steel batch boxes, 24 cu. ft.
2—Miles portable track, 24 in. gauge.

HOISTS

8¼ x 10 Lidgerwood S.D., D.C., skeleton.
8¾ x 10 Rawson-Morrison D.D., D.C., skeleton, link motion.
9 x 10 Mead-Morrison D.D., D.C., skeleton, link motion, cableway.
10 x 12 American D.D., D.C., skeleton.
6¼ x 10 Mundy S.Dr. D.C., with boiler.
7½ x 10 Lambert D.D., D.C., with Mass. boiler.
7 x 10 D.D., D.C., Lidgerwood skeleton.
8¼ x 10 National D.D., D.C., with boiler.
7 x 10 Lidgerwood 3 D., D.C., with boiler.

PAVERS

10-E Koehring, boom and bucket discharge.
14-E Koehring, boom and bucket discharge.
14-E Austin, boom and bucket, caterpillar traction.
21-E Austin, boom and bucket, caterpillar traction.
14-E Rex, boom and bucket, batchmeter.
14-E Lakewood, boom and bucket, batchmeter.
21-E Smith, chute discharge.
27-E Foote, chute discharge.

ROLLERS

10 ton Buffalo-Pitts, 3 wheel, Mass. Boiler and pressure scarifier.
10 ton Buffalo-Pitts, 3 wheel, rebuilt.
10 ton Monarch, 3 wheel.
10 ton Universal, tandem.
8 ton Buffalo-Pitts, tandem.
6 ton Buffalo-Pitts, tandem.
3½ ton Universal, tandem.

MISCELLANEOUS

4—Koehring paver loaders, with measuring boxes, 5 hp. gasoline engine.
5—18 ft. Lakewood finishing machines.
1—20 ft. Lakewood finishing machine.
No. 5 Leyner Drill Sharpener.
No. 2 Union Steam Hammer.
No. 3 Keystone Excavator, overhauled.

Boston Office
Old South Building
Main 4233

The HUBBARD-FLOYD CO., Inc.

MAIN OFFICE
Grand Central Palace
New York, N. Y.
Vanderbilt 1465

STIFF LEG DERRICK

1—10-ton American, 40-ft. mast, 90-ft. boom, with 22-ft. removable center section. Sheaves for five part boom line and two single hoisting lines with bull wheel.

STEAM HAMMERS

4—No. 1 Warrington, with MacDiarmid base (5-ton weight). Made by Vulcan Iron Works.

THE DETROIT EDISON COMPANY
2000 Second Avenue, Detroit, Michigan

For Sale

1—10-ton Buffalo Pitts Road Roller.
1—10-ton Monarch Roller.
1—7-ton Tandem Kelly Springfield.
24—4-yd. 36 in. Steel Draft Beam Western Cars.

STEAM SHOVELS

1—18 Osgood—Traction.
1—Model 31 Marion.
1—Model 36 Marion, 32 ft. Boom, 22 ft. Dipper Stick, Caterpillar, Shop No. in 4700 series.

UTILITY EQUIPMENT CO.
Yards and Shops
Office: 324 4th Ave., Pittsburgh, Pa.

ELECTRIC HOISTS

2—Buffalo, 3 drum, swinger attached, 75 hp. Motor, 220 volt, 3-phase, 60 cycle.

Terwilliger Equipment Company
2013 Market Street, Phila., Pa.

STEAM SHOVELS

A Real Bargain

Thoroughly rebuilt last year, full revolving, 4 wide traction wheels, 1¼ yd. dipper, 25 ft. boom with 2 additional 4 ft. sections, 16 ft. dipper stick.

FRANK T. CRAVEN CO.
50 Church St., New York City
Phones: Cort. 6341-7664

PUMPS FOR SALE

Davidson Hydraulic Pump, 14¼ x 22 x 12 x 24.
Worthington Duplex Pump, brass lined, 16 x 10¼ x 10.

Both pumps are in excellent condition and can be purchased at a *reasonable* figure.

Frank E. Gore, 51 Chambers St., New York City

FOR SALE

1—No. 3 Keystone Shovel.
1—Sullivan Air Compressor mounted on trucks with belt driving receiving tank and 60 hp. Buda Motor.
3—Ingersoll-Rand No. 33 W. Jackhamers.
175 ft. ¾ in. Air Hose.

All equipment in A1 condition. Can be seen at Kankakee, Ill.

ANTOIN JELIENIEWSKI
Address care
Shidler Construction, Material Co.
Kankakee, Illinois

FOR SALE OR RENT—*OWNED BY US AND SOLD UNDER ABSOLUTE GUARANTEE SUBJECT TO TRIAL IN SERVICE*

STEAM SHOVELS

1—Bucyrus 14-B, full revolving steam shovel, traction wheels, 22 ft. boom, 16 ft. dipper arm, special high lift, ¾-yd. dipper. Shop No. 3339. Built new, May, 1920; used 5 months.
1—Bucyrus 18-B, full revolving steam shovel. Shop No. 1870, mounted on traction wheels, ⅞ yd. dipper.
1—Model 36 Marion revolving shovel, Shop No. 3224; traction wheels; 2—1½ yd. dippers.
1—70-C Bucyrus, Shop No. 1472, 2½-yd. dipper.
2—Model 60 Marion Steam Shovels, shop Nos. 1776, 2400, 2½-yd. dippers with full manganese face; butt strap boilers. Shovels complete with tools and work rail sections.
1—45C Bucyrus, Shop No. 1202; 1¾ yd. bucket.

LOCOMOTIVES

1—Standard gauge 14 x 20 cylinder, Vulcan, 4 wheel, saddle tank Locomotive, Shop No. 1501, built 1910; weight 40 tons; automatic couplers; air brakes.
1—Standard gauge 16 x 24 cylinder, 4-wheel, saddle tank Locomotive, built by American Locomotive Wks. in 1909. Shop No. 44337, weight 43 tons; air brakes; automatic couplers.
1—Standard gauge, 18 x 24 cylinder 6-wheeled, switching Locomotive, with separate tender; weight 50 tons on drivers.
1—11 x 16 Standard gauge Davenport, 4 wheel, saddle tank Locomotive, Shop No. 1027, built new 1910, weight 20 tons, steam brakes, automatic couplers.
1—36 in. ga. 10 x 16 cylinder Porter 18 ton saddle tank Locomotive; Shop No. 5362; built new 1913, extended saddle tank, wide fire box, steam brakes and steel cab.
2—36 in. gauge 10 x 16 cylinder Vulcan 18 ton saddle tank Locomotives, shop Nos. 1345 and 1346.
3—36 in. gauge, 10 x 16 cylinder, Davenport and American 18 ton 4 wheel saddle tank Locomotives.

DUMP CARS

30—16 yd. standard gauge Western Air Dump Cars, steel underframes, box girder doors, U. S. Safety Appliance standard.
45—12 yd. standard gauge Western Air Dump Cars, steel underframes, U. S. Safety Appliance standard, 19 ft. beds, box girder doors.
20—12 yd. standard gauge Western Air Dump Cars, used four weeks, 60,000 cap., trucks, latest type with vertical air dump cylinders, steel underframes, box girder doors and most approved safety appliances.
34—4-yd. Western, 36 in. gauge. Side dump cars, wood sills and truss rod doors.
6—5 yard, Western, 36 in. gauge, heavy duty, side dump cars with steel draw sills and box girder doors. Cars new in November. Guaranteed good as new.
1—Western 36-in. gauge Spreader Car.

DRAGLINE EXCAVATORS

1—No. 2 Monighan steam operated, all steel Dragline, 60 ft. boom; 2 yd. Page bucket, mounted on skids and rollers.
1—Class 7, Bucyrus Dragline. Shop No. 798; steam operated, all steel construction, 42 ft. boom; 1 yd. bucket, mounted on skids and rollers.

MISCELLANEOUS

1—Stiff-leg Derrick, brand new, 60 ft. boom, complete with all fittings and 14 ft. bull wheel, no cable. Bargain.
1—¾-yd. new Hayward orange peel bucket.
Industrial Track—4500 ft. 36 in. gauge track made up of 25 lb. rail in 15 ft. sections with 6 and 7 steel ties to section.
1—25 ton Industrial M. C. B. Locomotive Crane Shop No. 3261, 55 ft. boom, 20 ft., extension, bucket handling mechanism Built 1916, 60 in. butt strapped boiler, 12 kw. generator for magnet.

CLAPP, NORSTROM & RILEY EQUIPMENT CO., 12 and 14 So. Canal St., Chicago

---

FOR SALE

2—10-ton Kelly Springfield Rollers.
1—10-ton Buffalo Pitts Roller.
1—1/3-yard Hayward Orange Peel Bucket.
1—¾-yard Hayward Orange Peel Bucket.
1—¾-yard Standard Clamshell Bucket.
1—7¼ x 10 in. D.C., 3 Drum National, with A.S.M.E. Boiler, and 3½ Dake Swinger.

Terwilliger Equipment Co.
2013 Market St., Phila., Pa.

FOR SALE OR RENT

LOCOMOTIVES

2—6-wheel Switchers—Standard gauge 40 ton.
2—American Passenger, Type 4-4-0, standard gauge, 50 ton.
2—60 ton standard gauge geared Locomotives.

STEAM SHOVELS

1—70-ton Bucyrus, 2½ yard Dipper.
1—18-B Bucyrus, Revolving. Traction Wheels, ⅞ yd. Dipper.
1—Little Giant, 1¼ yd. Dipper on R.R. trucks. Equipped with standard boom and dipper also with tunnel boom and dipper.
1—175-B Bucyrus Shovel, 3½ yd.
1—150-B Bucyrus Shovel, 2½ yd.

TRACTORS and TRAILERS

1—10-ton Holt Caterpillar Tractor, 40-60.
12—5-ton Troy Trailers.

DRAGLINES

1—No. 3, Monighan, 65 ft. boom, 3½ yard bucket, Steam Walker type.
1—Class 7 Bucyrus, 42 ft. boom, 1 yard bucket on caterpillar, steam.
3—Monighan 1T Walker, gasoline, 40 ft. boom, 1 yard bucket.
1—Class 14 Bucyrus on skids and rollers, 60-ft. boom, 2-yd. bucket.
1—Class 14 Bucyrus on caterpillar, 60 ft. boom, 2½-yd. bucket.
2—Class 24 Bucyrus dragline on skids and rollers, 100-ft. boom, 3½-yd. bucket.

BOX AND REFRIGERATOR CARS

20—60,000 lb. capacity Box Cars, 34 ft. 7 in. long.
20—60,000 lb. capacity Refrigerator Cars, 36 ft. long.

The above list is constantly changing. No matter what your machinery requirements are write us—we may have it.

BECK & BABB, 29 So. La Salle Street, Chicago, Ill.

CONTRACTORS' OVERHAULED EQUIPMENT

PUMPS

1—18 in. Morris centrifugal connected direct to double vertical steam engine, 12 x 12 Cylinder 10,500 gal., 25 ft. head.
1—10 in. Erie belt driven double suction centrifugal, 3500 gal., pulley 24 in. dia., 14 in. face.
1—20 in. Worthington Turbine, belt driven, pulley 34 in. diameter by 38 in. face.
1—15 in. Buffalo, belt driven, pulley 30 in. dia. by 22 in. face.
1—10 in. Morris Volute, belt driven.
1—Platt Duplex 9 x 5½ x 10 force pump.
1—Worthington Duplex 6 x 4 x 6 force pump.
1—Knowles Duplex 4½ x 2¾ x 4 force pump.
1—Cameron force pump No. 7.

CARS

20—12 yd. Western dump cars, standard gage.

CHANNELLING MACHINES

2—Sullivan Y8 Channelling Machines.

DRAGLINES

1—No. 1 Clyde Dragline, 40 ft. boom, 1 yd. bucket.
1—Class 14 Bucyrus, 60 ft. boom, 2 yard bucket.
1—Class 14 Bucyrus on caterpillar traction 2 yd. bucket.
1—Monighan, 60 ft. boom, 2 yard bucket.

LOCOMOTIVES

1—8 x 14, 10-ton Porter Saddle Tank Locomotive; 24 in. gage.
2—10 x 16, 18-top H. K. Porter, Dinkey 36 in. gage.
1—10 x 16, 18-ton Vulcan Dinkey, 36-in. gage.
2—20 x 26, standard gage, consolidated, Brooks.

ROCK DRILLS

3—Tripod rock drills, steam or air operated.
1—Drill sharpener, Sullivan.
1—Drill sharpener, Leyner.

BOILERS

1—30-hp. Vertical. For 100 lb. working pressure.
1—50 hp. Loco. type.

STEAM SHOVEL

1—Thew revolving 1 yd. dipper.

TRUCKS

3—4-wheeled House Moving Trucks.
2—Heavy Machinery Truck Wagons.

COMPRESSORS

1—18 x 18¼ x 24 Ingersoll-SargentSteam Driven, straight line, 656 f.p.m.
1—Sullivan 2 stage 20 x 12½ x 16 Belt Driven, 387 f.p.m.
1—12 x 12 x 16 Rand Duplex, Steam Driven, cap 500 f.p.m.
1—Westinghouse compound.

BUCKETS (CONCRETE)

2—McMyler 1½ yd. Center Line Dump.
4—Lockwood 5½ yd. Bottom Line Dump.
2—Steubner 1½ yd. Controllable.
2—Steubner 2 yd. Controllable.
1—Steubner ¾ yd. Controllable.
2—Atlas 1½ yd. Bottom Dump.
4—Top dump circular coal Buckets 3½ ft. D. x 3 ft.
7—Top dump, circular coal Buckets 3 ft. x 3½ ft.

MISCELLANEOUS

1—Lidgerwood unloader, 25-ton pull.

UNITED STATES EQUIPMENT CO., 208 S. La Salle St., Chicago

FOR SALE OR RENT

All the Equipment listed below is owned by us and may be inspected at one of our own warehouses.

CONCRETE MIXERS

3—Milwaukee 28-S batch hopper, equipped with 20 hp. A.C. Motors.
15—21-S Mixers, all capacity ¾ yard with steam engines and boilers or without power for electric motor, with side loaders or batch hoppers, following makes: Marsh-Capron, Smith Chicago, Ransome and Lakewood.
45—14-S Mixers, capacity ½ yard mixed material with steam engine and boilers, side loader and water tank, following makes: Marsh-Capron, Koehring, Milwaukee, Smith, Smith Chicago, Ransome, Chain Belt, Foote, Lakewood, Oshkosh, Cube, Ideal.
17—7-S one bag mixers with side loaders or low chargers, 13 with gas engines, 4 with steam engine and boiler.
6—Paving mixers, 3—Koehring No. 10 E, 1—Chain Belt No. 10 E, 1—Foote No. 10 E, 1—Smith-Chicago No. 10 E.

STEAM SHOVELS

2—Type A-1 Thew on traction wheels, one with long dipper stick for sewer work, one with ⅞ yard bucket for excavating or stripping.
3—Type O Thew Steam Shovels, on traction wheels, with ⅝ yard dipper.
1—Bucyrus 70 ton, on MCB Standard Gauge Trucks, with 2½ yard dipper.
2—Keystone Excavators.

LOCOMOTIVES

1—Vulcan 9 x 14, 36 in. gauge steam saddle tank.
1—Vulcan 7 x 12, 24 in. gauge steam saddle tank 9 tons.
2—Kopple 24 in. gauge steam, 8 tons.
2—Kopple 24 in. gauge steam, 6½ tons.

HOISTS

1—Mead Morrison 10 x 12 D.C., 3D with boiler.
2—9 x 10 D.C., D.D., with Boilers; 1 Lambert and 1 Lidgerwood with 4 independent clutch winch heads.
1—9 x 12 D.C., 3 Drum National with boiler.
2—9 x 10 double cylinder, three drum, Mead Morrison & Clyde.
2—9 x 10 double cylinder, single drum, Lidgerwood Skeleton.
2—8¼ x 10 double cylinder, three drum with boiler: 1 American and 1 Monighan.
1—8½ x 10 double cylinder, double drum Lambert.
4—7½ x 12 double cylinder, double drum Mundy, 1 with boiler and three skeletons.
11—8½ x 10 D.C., 3 Drum Lambert Skeleton.
3—8¼ x 10 D.C., D.D., Reversible Link Motion with boiler; 1 Lambert; 2 Lidgerwood.
4—7 x 10 D.C., 3 Drum Hoists with Boilers; 2 American; 1 Mundy; 1 National.
18—7 x 10 D.C., D.D., with boiler; 1 American; 4 Lambert; 6 Lidgerwood; 1 O. & S.; 1 National; 1 Flory; 1 Mundy; 2 Crooke; 1 Clyde.
4—7 x 10 D.C., D.D. Skeleton Hoists; 1 Lidgerwood; 2 Mundy; 1 National.
6—6¼ x 10 D.C., D.D., with boiler; 3 Mundy; 1 Flory; 2 National.
2—6¼ x 10 D.C., D.D. Skeleton; Mundy.
1—5½ x 8 D.C., D.D. American with boiler.
1—50 hp. Thomas D.D. Hoist with 50 hp. A.C., 220 Volt, 60 Cycle, 3 Phase Wagner Slip Ring Type Motor.
7—Swinging Engines, Dake, Clyde, Lidgerwood, American.

RAIL AND TRACK

5 miles 24 in. gauge portable track, with steel ties, made up of 20 lb. rail, with switches.
1000 ft. 36 in. gauge portable track, with steel ties, with two switches.

CRANES

1—15 ton 8 wheel M. C. B., O. & S. Locomotive Crane with 40 ft. steel boom, bucket handling.
4—Byers Auto Cranes, 1 on caterpillar, 3 on traction wheels with 30 ft. boom with ½ or ¾ yard clam shell buckets.

DERRICKS

2—Shannon stiff leg Derricks, boom 14 x 14 x 75 ft., mast 12 x 12 x 38 ft., bucket handling.
3—Terry & Tench stiff leg Derricks, boom 14 x 14 x 60 ft., mast 12 x 12 x 32 ft., bucket handling.
2—Lambert stiff leg—boom 12 x 12 x 50 ft., bucket handling.
1—Shannon Guy Derrick, 14 x 14 x 80 ft. mast, 14 x 14 x 75 ft. boom, bucket handling.
1—Lambert Traveling Derrick, with 50 ft. boom, bucket operating, track gauge 16 ft., with National 7⅞ x 10 D.C. 3 drum hoist with boiler; complete outfit.
2—All Steel Stiff Leg.
1—10 ton with 70 foot boom.
1—15 ton with 60 foot boom.
5—Brand New American Stiff Leg Derricks, boom 12 x 14 x 56 ft., bucket operating.

CLAM SHELL BUCKETS

1—2 yard Clam Shell: 1 O. & S.
3—1½ yd. Buckets; 1 class E-Hayward; 1 O. & S.; 1 Mead Morrison.
5—1 yard Buckets; 1 Hayward; 2 Standard; 1 Orton and Steinbrenner, 1 Haiss.
6—¾ yard Buckets; Standard, O. & S.; McMyler; 1 Haiss, Owens, Williams
4—½ yard Buckets; 3 Standard; 1 Kiesler.

We carry a complete line of Boilers, Compressors, Cars, Engines, Elevators, Hoppers, Steam Hammers, Rollers, Pumps, Spouting and Portable Track. Write or wire your requirements.

Equipment Corporation *of* America

PITTSBURG: 855 Empire Bldg. **CHICAGO: 1455 Lumber Exch.** **PHILADELPHIA: 655 Land Title Bldg.**

FOR SALE

MACHINERY *and* EQUIPMENT

LOCOMOTIVE CRANES

1—15-20-ton Brownhoist 8-wheel M. C. B. 40 ft. boom, bucket operating drums.
1—15 ton Q & S 8 wheel, M. C. B., 70 ft. boom with 25 ft. removable section. Double power driven drums, also dragline attachments, equipped with outriggers.
New Locomotive Cranes on traction wheels, 30 ft. boom, ¾ yard bucket.

BYERS AUTO CRANES

1—Late type on Traction Wheels, 30-ft. Boom, ¾-yd. Bucket. Machine like new, in condition.
1—Type 3 on caterpillar traction, 30 ft. boom, ¾ yard bucket. A1 condition.

REVOLVING TRACTION SHOVELS

1—Marion, Model 31, 1-yd. dipper, shop No. 3068.
1—Marion Model 28, ⅝ yd. dipper, shop No. 3328.

1—Marion Model 21 Caterpillar Traction, ¾-yd. dipper.
1—Marion Model 40 on R.R. trucks, 1½ yd. Dipper.

LOCOMOTIVES

American 6-wheel switcher. Cylinders 18 x 24-in. Drivers, wheel base, 11-ft. 6-in. Weight on drivers, 120,000 lb. Carries 150 lb. steam. Excellent condition. Just out of shop.

BOILERS

1—30 hp. locomotive type portable boiler and engine mounted on iron wheels with engine mounted on top of boiler.
1—50 hp. fire box, locomotive type, 100 lb. pressure.
1—70 hp. fire box, locomotive type, 100 lb. pressure.

PUMP

1—Swaby, direct connected to steam engine, 6-in. suction, 5-in. discharge.

CONCRETE MIXERS

2—Smith, ½-yd. machines, no power, have large stationary batch hopper.
2—Smith No. 1 gasoline driven, on trucks.
2—Smith No. 11 steam driven, on trucks with side loaders.
1—Cube No. 11 steam driven, on trucks with side loader.
6—Cube No. 17 steam driven, on trucks with side loaders.

CARS

4—¾-yd. capacity, V-shaped, all steel, two-way dump, 18-in. gauge.
1—1-yd., V-shaped, all steel, two-way dump, 24-in. gauge.

AIR COMPRESSOR

1—Norwalk two stage, steam driven air cylinder 17½-in., steam cylinder 24-in., stroke 30-in., 1659 ft. of air at 100-lb.

ASPHALT PLANT

1—Iroquois 800 yd. Road Asphalt plant. Complete, fine condition.

ROAD ROLLERS

1—Good Roads Machine Co. 10-ton tandem Steam Roller.
1—8 ton Universal tandem roller.

HOISTING ENGINES

2—Byers, 16 hp. double cylinders, double drum, equipped with boilers, swinging gears.

MINE AND CABLEWAY HOISTS

1—Flory Skeleton, 8¼ x 10 D. C., D. D. link motion, with quadrant.
Lambert, 10½ x 12, double cylinder, single drum, 36-in. diameter, 24-in. face. Drum grooved; will take up ⅞-in. cable. Drum flanges 8 in. deep. Link motion.
Flory 10 x 12, double cylinder, double tandem drum engine, drums 40-in. diameter, 40-in. face. Operating levers banked in quadrant.

CRUSHER

1—Gates 18-K, A-1 condition; Gates Revolving Screens, 60 in. x 20 in.; 42 in. Bucket Elevator, 80 ft. centers.

BUCKETS

1—1½ yd. Hayward Clam Shell Bucket.
1—1¼-yd. bucket, Single Line
1—¾-yd. Orange Peel, 3 blades, for rock work.
1—1-yd. Clamshell Bucket.

STEAM PILE HAMMER

1—Cram Steam Hammer equipped for round piles, total weight about 8000 lb. Weight of Ram 5500-lb.

PIPE

1000 feet 6-in. 3100 feet 2 in.
3200 feet 4 in. 1700 feet 1½ in

F. MAYER, 737-738 Monadnock Bldg., Chicago, Ill.

FOR SALE OR RENT

CONCRETE MIXERS

2—Multi-foote Paving Mixers, 27 ft. with chutes, on traction wheels.
1—Koehring Paving Mixer, 11 ft. with boom and bucket, traction wheels.
1—Rex Paver Mixer, 14-E Boom and bucket, traction wheels.
1—Koehring Paver Mixer, 22-E Boom and bucket, traction wheels.
2—Ransome Mixers, ½ yd. on wheels, with 10 hp. Novo Engine.

ROAD ROLLERS

2—10 ton 3-Wheel Buffalo Pitts Rollers.
1—5 ton Tandem Buffalo Pitts Roller.
1—5 ton Erie Asphalt Roller.

MISCELLANEOUS

3—Byers Auto Cranes on traction wheels, Steam, Electric and Kerosene operated.
1—No. 3 Keystone Excavator
3—7 x 10 Double Drum Hoisting Engines.
1—8¼ 10 Double Drum Hoisting Engine.
1—9 x 10 Triple Drum Hoisting Engine.
1—Electric Cableway Outfit.
1—84 hp. Lambert Electric Hoist suitable for clam shell bucket outfit with derrick fittings and bucket.

Derricks, Compressors, Buckets, Dump Cars

Forsythe Brothers
30 Church St., New York City

SERVICE
$200,000
worth of
Rebuilt Equipment

FOR SALE OR RENT

Consisting principally of

LOCOMOTIVES
STEAM SHOVELS
DUMP CARS
LOCOMOTIVE CRANES

In addition to this good rebuilt equipment we offer you fifteen years' experience of buying, selling, repairing and renting of heavy construction equipment.

Your inquiries will bring our best proposition

Contractors Service Company
52 Church St., New York City

FOR SALE

1—8 in. x 12 in. Mundy D.C., 3 D., Dake swinger, 60 ft. boom, stiff leg derrick, ¾ yard Owen Clamshell, Butt Strap Boiler.

TERWILLIGER EQUIPMENT CO.
2013 Market Street, Phila., Pa.

UPRIGHT BOILER

1—60-hp. A.S.M.E. Upright Boiler. Complete with all fittings and fixtures. Brand NEW. Built by Coatsville Boiler Works. Located in Philadelphia.

B. M. WEISS
1324 Widener Bldg., Philadelphia, Pa.

FOR SALE

1—Rebuilt Koehring 14-E Traction Paver, Boom and Bucket, Batchometer.
1—14-E Lakewood Paver, Boom and Bucket, Batchometer.

TERWILLIGER EQUIPMENT CO.
2013 Market Street, Phila., Pa.

Road Builders' Plant

3—10 ton Buffalo-Pitts 3-wheel STEAM ROLLERS
1—10 ton Kelly-Springfield 3 wheel STEAM ROLLER.
1—8 ton Buffalo-Pitts TANDEM ROLLER.
1—5 ton Buffalo-Pitts TANDEM ROLLER.
2—14-E Rex PAVERS with boom and bucket.
1—14-E Lakewood PAVERS with boom and bucket.
1—6-A Foote PAVER with distributing chute.
1—27-E Foote PAVER with distributing chute.
1—No. 16 Koehring PAVER with boom and bucket.
3—Buffalo-Pitts TRACTION ENGINES.
1 Austin SCARIFIER.
2—Lakewood ROAD FINISHING MACHINES.
1—600 gal. WATER WAGON.
1—600 gal. Hvass ROAD OIL DISTRIBUTOR.
1—2 in. Cameron STEAM PUMP.
1—2 in. Barnes gasoline force PUMP.
12,000 ft. 2 in. RETHREADED PIPE.
2000 ft. 6 in. Blaw Knox STEEL ROAD FORMS.
1 Austin Giant GRADER, 8 ft. blade.
2 Model 3 Keystone SHOVELS.
Erie Type B STEAM SHOVEL.
1 Byers Auto Crane, 35 ft. boom.
2—500 gal. ASPHALT HEATING KETTLES.
4 Brand new 5½ ton MACK MOTOR TRUCKS.
2—3 ton 24 in. gauge PLYMOUTH LOCOMOTIVES.
1—7 ton 24 in. gauge BALDWIN LOCOMOTIVE.
3000 ft. 20 lb. 24 in. gauge PORTABLE TRACK and SWITCHES.
ALL KINDS OF CARS AND OTHER EQUIPMENT.

Reading Engineering Co., Inc.
1228 Tribune Bldg., New York City

Repaired Equipment
FOR SALE OR RENT

STEAM SHOVELS

2—Marion 60 Shovels, shop Nos. 1999 and 2059.
1—Model 70-C Bucyrus, shop No. 1219.
1—Model 60 Marion, shop No. 2130.
1—Model 0 Thew on traction wheels, ½ yard.
1—Model 28 Marion on traction wheels, 5/8 yard.

BUCKET

1—1¼ yd. Hayward orange peel, four leaf.

LOCOMOTIVE CRANES

2—McMyler 20-25-ton, 8-wheel, double drum, bucket handling, 50-ft. boom.

CARS

1—Standard Gauge Western Spreader Car.
20—12-yard Western, air-dump, standard gauge.

LOCOMOTIVES

2—18 x 24 in., 50-ton, 0-6-0, standard gauge.
1—17 x 24 in., 55-ton, 4-6-0, standard gauge.
1—14 x 20 in., 36-ton, standard gauge, 0-4-0, saddle tank.
8—18-ton, 10 x 16 in. Porter Dinkeys, 36 in. gauge.
3—25-ton Forney type.

H. KLEINHANS CO., Pittsburgh, Pa.
(UNION ARCADE)
Eastern Office: 30 Church St., New York

FOR SALE OR FOR RENT

CONCRETE MIXERS

Rebuilt and Guaranteed

3—7 ft. Boss mixers on trucks with gasoline engines.
8—10 ft. Boss mixers on trucks with gasoline engines.
4—½ yd. Boss mixers on trucks with gasoline engines.
3—¾ yd. Boss mixers on trucks with gasoline engines.

NEW BOSS MIXERS

In our Weehawken Warehouse for Immediate Delivery

2—4S Boss mixers with gasoline engines and barrow hoppers.
2—4S Boss mixers with gasoline engines, power loaders and water tanks.
3—7S Boss mixers, gasoline engines, power loaders and water tanks.
2—7S Boss mixers, gasoline engines, power loaders and water tanks.
2—10S Boss mixers, gasoline engines, power loaders and water tanks.
2—10S Boss mixers, gasoline engines, power loaders and water tanks.
1—14S Boss mixer, gasoline engine, power loader and water tank.

LAKEWOOD CONCRETE TOWERS

1—60 ft. Lakewood tower complete with one yard hoist bucket and 36 ft. floor hopper.
1—110 ft. Lakewood tower complete with same equipment as above.

Both towers complete in every way with all bolts and guy lines ready for immediate delivery.

HOISTING ENGINES

One Stroudsburg three drum electric with swinger 52 hp. 20 volt, D.C. motor used less than one month.
1—6¼ x 8 D.C. D.D. Mundy hoist with boiler with N. Y. City inspection.
1—Lidgerwood high speed single drum electric hoist with 40 hp. 220 volt 60 cycle, 2 phase motor.
2—Mundy single drum hoists, with 33 hp., 220 volt, 2 phase, 60 cycle, motors.
1—7 x 10 D.C. D.D. Lidgerwood hoist with A.S.M.E. boiler.
1—3½ Dake swinger.
1—No. 4 Dake swinger.
1—4 x 6 Lidgerwood swinger.

DERRICKS

1—10 ton stiff leg, 14 x 14 x 65 ft. boom and steel bull wheel.
1—5 ton stiff leg, 12 x 12 x 50 ft. boom and steel bull wheel.
4—extra steel bull wheels.

BOSS HOISTS

1—single drum reversible with 5 hp. Hercules engine.
1—single drum reversible with 7 hp. Hercules engine.
1—single drum one way, with 5 hp. Hercules engine.
1—single drum one way with 7 hp. Hercules engine.
1—double drum Boss hoist with 7 hp. Hercules engine.
1—double drum Boss hoist with 10 hp. Ideal engine.
1—Stroudsburg single drum belted hoist.

PUMPS

2—No. 4 Pulsometers.
2—No. 5 Pulsometers.
1—No. 6 Pulsometers.
2—No. 7 Pulsometers.
1—No. 4 Emerson.
1—No. 5 Emerson.
1—No. 3 Nye.
1—No. 4 Nye.
1—No. 5 Nye.
1—Goulds, centrifugal 6 in. suction, 4 in. discharge D.C. to steam engine.
1—Goulds, centrifugal 5 in. suction, 4 in. discharge D.C. to steam engine.
1—Lawrence 10 in. suction, 8 in. discharge belted.
3—Edwards 6 in. suction, 6 in. discharge belted.
1—Barnes double 4 in. diaphragm with 3 hp. Novo engine on wheels.
1—Barnes single 4 in. diaphragm with 2 hp. Novo engine on wheels.
7—Domestic single 4 in. diaphragm with Domestic Engine and suction hose.

GASOLINE TRACTORS

2—12-20 Emerson Brantingham gasoline kerosene tractors New at a bargain.

STEAM HAMMERS

1—750 lb. McKiernan
1—750 lb. Hamilton
1—No. 2 Vulcan

BUCKETS

6—⅜ yard contractors tip over buckets
12—1 yard contractors tip over
1—⅜ yard Smith orange peel four leaf
1—½ yard Haiss clamshell
1—¾ yard Haiss clamshell
1—1 yard Haiss clamshell

COMPRESSOR OUTFITS

Ingersoll Rand type
1—40 hp. Locomotive boiler on wheels.
4—Jap drills with steel hose pipe and all connections, a complete outfit ready for work.
2—"AA2" 1115 ft. compressors.
1—"A" 807 ft. compressor
2—4 ft. x 12 ft. Receivers.

EDWARD EHRBAR, Inc., 270 West St., New York

FOR SALE

1—70-C Bucyrus Steam Shovel, excellent condition, located Cleveland, Ohio.
1—Model 36 Marion Steam Shovel, caterpillar traction, practically new, located Mansfield, Ohio.
1—100,000 lb. capacity, all-steel Jordan Air Spreader, practically new, used 30 days, located Mansfield, O.
1—10 Wheel 19 x 26 Baldwin Locomotive, standard gauge, 160 lb. steam pressure, located Cleveland, Ohio.
2—BRAND NEW 48 ton 6-wheel switchers, never used.
1—J-2 Rogers 4-wheel switcher, located Cleveland, Ohio.
1—Type 1-A Monighan Steam Dragline machine, traction wheels, 1-yd. bucket, located Canton, Ohio.
8—16-yd. standard gauge Western Dump Cars, steel underframes, steel lined floors, located Mansfield, Ohio.
1—No. 0 Non-traction Cyclone Well Drill, located Cleveland, Ohio.
1—30 ton Saddle Tank standard gauge Baldwin Dinkey, Cleveland, Ohio.

THE FRED R. JONES CO., Inc.
111 W. Washington Street, Chicago, Ill.

FOR SALE

12—Standard gauge K & J 6 yard, 2 way dump cars.
9—36-in. gauge Lakewood 2-way Dump V. shape steel cars.
10—24-in. gauge Koppel Cars.
1—18-ton Galion stone unloader.
1—No. 5 Allis-Chalmers gyratory type crusher.
1—10-ton Monarch steam road roller.
1—10-ton Heuber steam road roller.
1—3-drum American Hoist, 7 x 10.
1—2-drum American Hoist, 6¼ x 8.
2—20-ton standard gauge saddle tank Porter Locomotives.
1—18-ton 36-in. gauge Porter saddle tank locomotive.
1—Erie "B" full revolving steam shovel.
1—Little Giant Vulcan steam shovel, railroad type.

Fire box boilers and vertical boilers of all sizes.

Write, Wire or Phone us for Specifications

The Central Machinery & Equipment Inspection Bureau
Office and Yards
2631 York St., Toledo, Ohio

FOR SALE

WATER TUBE BOILERS

Four Stirling, 512 hp. each, working pressure 160 lb., complete with new Westinghouse Electric Stokers.

Purchase Department
WILSON & CO.
41st and Ashland Ave., Chicago

FOR SALE

1—15-ton 8-wheel, Brownhoist, 42 ft. 6 in. boom, bucket drums, late shop number, attractive price.

TERWILLIGER EQUIPMENT CO.
2013 Market Street, Phila., Pa.

MIAMI CONSERVANCY EQUIPMENT

The completion of the Miami Conservancy District will release for sale in the late fall a large part of the $2,000,000 worth of construction equipment used on this project. This includes 20 Draglines in various sizes, 15 Locomotives, 100 12-yard Dump Cars, Concrete Mixers, Electric Motors, Transformers and other equipment.

Following List Now Ready

BOILERS

2—Gem City 15 hp. Horizontal Boilers, 100 lb. pressure.
1—Gem City 25 hp. Horizontal Boiler, 100 lb. pressure.
1—15 hp. Brownell Scotch Boiler, 15 lb. pressure, horizontal, mounted on skids, 44 in. x 70 in.

CARS

12—Western air dump standard gauge cars, 50,000 lb. capacity.

AIR COMPRESSOR

1—Sullivan air compressor, 10 x 10, belt driven capacity 213 cu. ft. free air per minute at 100 lb.

DRILLS

6—Sullivan, Class 2, steam or air rock drills, 3¼ cylinder.
1—Sanderson Cyclone, Class B, non-traction well drill, with 24 ft. derrick.
8—Ingersoll-Rand E-44, steam or air rock drills.

MOTORS

1—5 hp. Fairbanks-Morse Motor, induction, 3 phase, 440 volts.
3—20 hp. Wagner motor, for industrial elevator, 3 phase, 440 volt, 22 hp. G. E. Motor, 440 volt, 3 phase.
1—30 hp. Allis-Chalmers squirrel cage, motor, 3 phase, 440 volt.
1—50 hp. Westinghouse squirrel cage induction motor, 3 phase, 440 volt.

MISCELLANEOUS

4—Spud Hoists for use on dredge or scow, with or without motors.
7—Buckets, 1½ yd., bottom dump, concrete, double bale.
1—Champion rock crusher, 16 in. x 22 in. jaws.
1—3 hp. International Harvester gas engine, vertical.
1—6 hp. Foos horizontal gas engine.

Weinman brass fitted automatic pumps with receivers, 3½ x 2¼ x 5.

Complete equipment for stern wheel steam tug, including stern wheel steamboat engines 8¼ in. x 42 in. and 5 in. x 16 ft. Also a 60 hp. Marine Boiler.

Miami Conservancy District
Sales Division, Dayton, Ohio

Rock Crushers (Jaw)

First Class—Ready for Shipment

1—8-in. x 14-in. Buchanan.
1—9-in. x 15-in., No. 4, Portable, with Elevator, Champion.
1—10-in. x 15-in., No. 4CF, Portable, with Elevator and Screen, Champion.
1—10-in. x 18-in., with Elevator, Reliance.
1—11-in. x 26-in., No. 5 Champion.

Attractive Prices

Also a complete stock of Boilers, Pumps, Hoisting Engines, Concrete Mixers, Air Compressors, and other Contractors' Equipment.

L. F. SEYFERT'S SONS, Inc.
437 N. 3d St., Philadelphia, Pa.

"Let George Do It"

FOR SALE OR RENT

COMPRESSORS

1—8 x 8 Clayton, chain driven.
2—8 x 8 Clayton, belt driven.
1—6 x 8 Ingersoll-Rand, belt driven.
2—6 x 6 Ingersoll-Rand, belt driven.
1—36 ft. Curtis, gasoline driven.
2—24 ft. Schramm, gasoline driven.
37—Rock Drills, various sizes.
20—Riveting Hammers, various sizes.
A complete line of Mixers, Derricks, Hoists, Engines, Buckets, Pumps, Drills, and Drill Steel always in stock.

Established 1873

E. GEORGE & CO., INC.
407-409 Broadway, N. Y. C.

FOR SALE OR RENT

1—15-ton, 4-wheel

Locomotive Crane

40-ft. boom, double drum, bucket operating. Splendid condition, very attractive price.

FORSYTHE BROTHERS
30 Church St., New York City

Second-Hand

MACHINERY

Contractors' Equipment

Stacks, Tanks, Pipe, Etc.

What are your requirements?

Henry A. Hitner's Sons Co.
4501 Richmond St., Philadelphia, Pa.

FOR SALE

1—**Incline** built by the Dobbie Foundry Company.
1—Class 24 Bucyrus **Dragline.**
1—Osgood 29 **Steam Shovel.**
1—Thew one yard **Dipper** on R. R. Trucks
1—Osgod combination **Dragline and Shovel.**
1—Osgood 18 **Clam Shell** outfit.
1—50 ton Geared **Locomotive,** standard gauge.
1—14 ton **Porter,** 36 inch gauge.
1—4 sack Multifoote **Paver** on caterpillar thread.
1—Small Rex **Paver.**
1—10 ton 3 wheel Kelley Springfield **Roller.**
1—Guy **Derrick Steel,** 110 ft. mast, 100 ft. boom.

JAMES CARROLL
917 Wainwright Bldg., St. Louis, Mo.

IMMEDIATE DELIVERY

6, 7½, 9, 10 and 18 K Crushers
18 K GATES Angle Drv. $11,000.
No. 4 GYRATORY CRUSHING PLANT, N. Y.
No. 36 Disc Crusher Mang. fitted.
2—150-hp. 125-lb. Marine type boilers and others.
No. 10 McCULLY—BARGAIN, $6,750.00.
4 No. 6 Gates (Mang. Fit.) nickel steel shafts.
50- and 75-hp. single drum hoists for motor drive.
No. 2, 3 and 4 Gates, reg. drive.
Air Compressors (steam-belt) 50 to 4000 ft.
5, 6 and 12 ton, 24-in. gauge gasoline locomotives.
1—8 x 8 and 10 x 10 Air Comp. (belt).
2—180-ft. Quick Shift, 30-ft. bucket towers.
6-in., 8-in. and 10-in. SAND PUMPS.
25—40-hp. Thomas D. D. Elec. Hoist A. C.
5,- 10- and 15-ton HOLT TRACTORS, PRAC. NEW
1, 2 and 3 DRUM STEAM HOISTS.
Send us your inquiries—Sand Pumps, Motors, Contractors' Equipment, etc.

ROSS POWER EQUIP. COMPANY
Indianapolis, Ind.

IMMEDIATE DELIVERY

4—7-½ x 12 double cylinder, 28 hp. Mundy four independent clutch winch bridge erector's engines with boilers. $650.00 each.

2—10 x 10-¼ x 12 Class A Ingersoll-Rand steam driven air compressors. Capacity 177 cu. ft. free air per minute. $600.00 each.

1—8 x 8 x 12 Knowles duplex flywheel steam driven air compressor. Capacity 224 cu. ft. free air per minute. $600.00.

7—5 ton Yale & Towne Triplex Blocks. $140.00 each.

6—2 ton Yale & Towne Triplex Blocks. $70.00 each.

All f.o.b. our yard

The Day & Maddock Co.
Winslow Ave. N. W. & B. & O. R. R.
Cleveland, Ohio

OIL STORAGE TANKS

18,900 gallons capacity

Size 10 ft. 6 in. x 29 ft., 5 in. long.

10,200 gallons capacity

Size ft. 0 in. x 35 ft., 0 in. long.

¼-inch material throughout; 18 in dia. manhole. Built to Standard Oil specifications. Prices quoted on application.

IMMEDIATE DELIVERY

NEW YORK CENTRAL IRON WORKS COMPANY, INC.
Main Office: Hagerstown, Maryland
30 Church St., New York
1023 Widener Bldg., Philadelphia
Builders Exchange, Baltimore

TANKS FOR SALE

In All Parts of the Country

Over 4000 steel storage tanks.
Over 2000 wood tanks
Over 500 tanks with agitators, jackets etc.
Over 1800 rectangular steel tanks
Over 1500 glass enameled tanks
Over 1250 steel pressure tanks
Over 15 tanks and towers

New and Used Tanks Chemical Equipment
Mechanical Equipment

Largest dealers in tanks

THE CURTISS-WILLIS CO.
30 Church St., N. Y.

BOILERS

We have for sale three 520 HP. B. & W. Boilers, 250 lb. pressure, equipped with superheaters (50°) and Murphy Stokers.

There is available also complete coal - handling apparatus, feed water regulators, injectors, flow meters, soot blowers, breeching, necessary high pressure valves and fittings, and other appurtenances.

We also have for sale one Stokes triple-effect Evaporator, 3000 sq. ft. total heating surface, and one Ingersoll-Rand high-duty air compressor (1260 cu. ft. per minute).

This material has never been used and is in excellent condition.

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2—710 C.F.M. Class WJ3 Sullivan Angle-Compound Belt Driven Air Compressors. Practically good as new. Immediate shipment.

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628 Monadnock Block, CHICAGO, ILL.

PORTABLE COMPRESSORS
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Gasoline, Kerosene, Steam and Electric Compressors
Jackhammers, Riveting Hammers, Chipping Hammers and Wood Borers
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Offered at much less than market prices

All or any part of 42 miles new, ten-inch, 41 lb., steel line pipe F. O. B. or F. A. S. New York. Inspected by Pittsburgh Testing Laboratories.

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GOOD reconditioned also new **PIPE**

All Sizes

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15,000-ft.— 4-in. Class "C"
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Specials B. & S. 4-in. to 20-in.
Corey-Rensselaer Fire Hydrants, 4½-ft. Bury, 6 in. Hub Connection.
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9,000 Pcs.—3-in. O. D. Seamless Tubes. No. 10 Gauge, 7-9 ¼-in. long (new) certified by Lloyd.
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Made by the National Tube Co.

50,000 ft., 6 in. pipe
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Also 1,000,000 ft first class second hand pipe from ⅜ in. to 14 in. in stock at lowest prevailing prices

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With new threads and couplings; also cut to sketch.

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Large Stock All Sizes Threaded and with Couplings Also Cut to Sketch

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1-in. to 6-in.

With New Threads and Couplings

Pipe cut to sketch a specialty

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WITH PERFECT THREADS AND COUPLINGS

BLACK	GALVANIZED	BLACK	GALVANIZED
40,000 ft. 1"	15,000 ft. 1"	4,000 ft. 3½"	1,000 ft. 3½"
30,000 ft. 1¼"	10,000 ft. 1¼"	8,000 ft. 4"	4,000 ft. 4"
15,000 ft. 1½"	9,000 ft. 1½"	4,000 ft. 5"	2,000 ft. 5"
50,000 ft. 2"	10,000 ft. 2"	2,500 ft. 6"	1,500 ft. NEW 12"
20,000 ft. 2½"	5,000 ft. 2½"	2,000 ft. 8"	galv. spiral flanged
15,000 ft. 3"	15,000 ft. 3"	2,500 ft. 10"	pipe.

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New, Untested, Black Steel Pipe for every industrial and manufacturing purpose—random or cut lengths. We have a large stock of first quality mill material.

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No. 3 Keystone Shovel

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1—6¾ x 12 Mundy D.C., S.D. Hoister
1—6½ x 10 Lambert D.C., D.D. Hoister with Boiler
1—66 cu. ft. Westinghouse Compressor, wall type (NEW)
1—70 cu. ft. Fairbanks-Morse Gasoline Compressor
3—McKiernan Terry Sheath Pile Hammers
2—½ yd. Cropp Concrete Mixers with Engines
1—11 cu. ft. Municipal Concrete Mixer with Engine
1—¾ yd. Stuebner Bottom Dump Concrete Bucket
2—1 yd. Controllable Bottom Dump Concrete Buckets ½, ¾ and 1 yd. Side Dump Buckets

MARVIN BRIGGS, INC.
167 Sixth St., Brooklyn, N. Y.

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1—No. 3 Byers Crane, Caterpillar traction. New August, 1920. Equipped with 30-ft. boom and ¾-yd. Owen Clamshell Bucket with steel manganese teeth. Located at Youngstown, Ohio.

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Above material in good condition. Prompt Delivery. Inspection Invited.

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1—**Peerless** Crane, 30 ft. Boom-handle ¾ yd. Bucket.

Can sell at bargain.

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1—15-ton McMyler Locomotive crane, Std. Gage, 8-wheel, 50 ft. boom. Bucket handling. Built 1913. Immediate delivery.

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Guaranteed Equipment for Contractors

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50,000 ft. 6 in. with couplings, excellent condition.
8,000 ft. 20 in. A. & R. Spiral riveted 17 ft. to 25 ft., plain ends or Root couplings.
89,000 ft. ¾ in. to 12 in., complete with threads and couplings.
10,000 ft. 30 in. dia., 18 gauge new Ventilating Pipe.
10,000 ft. 18 in. dia., 18 gauge new Ventilating Pipe.

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1—150 hp. Internal Fired Marine Type, 125 lb. pressure.
1—100 hp. 60 in. x 18 ft. Horizontal Tubular, 115 lb. pressure.
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2—150 hp. 66 in. x 20 ft. Horizontal Tubular, 125 lb. pressure.
2—100 hp. Scotch Marine, 100 lb. pressure.
2—45 hp. Vertical Tubular, 90 lb. pressure.
2—25 hp. Vertical Tubular, 90 lb. pressure.
5000—3 in. Boiler Tubes, 20 ft. long, brand new.
6000—2 ft. Boiler Tubes, in various lengths, brand new.

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8—Brand New No. 2 portable cranes, 6 ft. 6 in. high, lift 5 ft. 4 in., overhang 2 ft. 6 in. Lifting capacity 4000 lb.
4—Brand New No. 3 portable cranes, 7 ft. 6 in. high, lift 6 ft. 4 in., overhang 2 ft. 9 in. Lifting capacity 5000 lb.

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1—No. 1 Chicago Concrete Batch Mixer, 10 cu. ft. capacity, with steam engine and boiler mounted on wheels.
1—Smith gasoline engine, power driven—portable—mounted on structural steel trucks, with feed chute capacity about 6 cubic feet unmixed material per batch.
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150—12-yd. Western & Oliver all-steel, two-way Dump Cars, standard gauge.
50—1¼ yd. 20-in. gauge, wood body, two-way Dump Cars.
3—36-in. gauge, 8-wheel Flat Cars, 40,000 lb. cap., 7-ft. wide, 20-ft. long, wheels 24-in. diam.

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1—Reliance 12 x 24 in. Jaw Crusher.
2—Kent Crushing and Pulverizing Mills.
1—10 x 16 Buchanan Rock and Ore Crusher.
1—24 x 14 Type "C" Buchanan Crusher.
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2,000 tons of plain wire bought from the French Government. Sizes 1½, 6, 8½ and 13 gauge.

ASBESTOS SHEETS

50 tons asbestos ½ in. and ⅞ in. thick, full size sheets; new, perfect material.

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1—Austin 5-ton full revolving horse-drawn 2-wheel Road Roller.
1—10-ton 3-wheel Steam Road Roller.

STEAM ENGINES

10—6 x 6 vertical plain slide valve.
15—9 x 9 vertical plain slide valve.

EXPANDED METAL

480,000 square feet of Expanded Metal in various sizes and meshes.

MISCELLANEOUS

17—½-yd. Bottom Dump Concrete Carts.
50—1½-yd. All-Steel Bottom Dump Buckets.
27—Hydraulic Tunnel Jacks, 8½ in. diam. ram, 32 in. stroke.
75 tons brand new—2 ft. x 4 ft. x ⅛ in. checkered design Floor Plates.

Write for Industrial Bulletin No. 204

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1—25-ton Industrial, 8-wheel standard gauge Locomotive Crane. Double drum for handling a clamshell bucket; 50 ft. boom; ASME boiler; full MCB; new 1918; fine condition.

4—15-ton Brown hoist Locomotive Cranes. 8-wheel standard gauge; double drum for handling a clamshell bucket; full MCB; ¾ steel cab; Massachusetts Standard boilers. All Machines in exceptionally fine condition. Equipped with 50 ft. and 70 ft. booms.

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WRITE ***WIRE*** ***'PHONE***

FOR SALE

LOCOMOTIVE CRANE

1—20-ton, 8-wheel, standard gauge, Browning, built Oct., 1919, A. S. M. E. Boiler, 50-ft. Boom, Double Drums, M.C.B. Trucks, Outriggers. Excellent Condition. Attractive Price.

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Brownhoist Locomotive Crane, 5 ton cap.; double drums, 4-wheel, Ohio-Mass. boiler.
Mack Trucks (new), 5½ ton cap.; bargain.
Ohio locomotive crane, 20 ton cap., 8-wheel, M. C. B., 40 ft. or 60 ft. boom double drums.
Baldwin saddle tank locomotive, 29 tons.

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Big Bargain
10 Ton

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All Steel; Brand New; 80-ft. Boom; Ball Bearing Head Top of Mast; Bull Wheel; Bucket Handling.

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ROAD MAKING MACHINERY

INQUIRIES SOLICITED

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Two ¾-yard, Type 18 Osgood

Revolving Shovels

One extra long boom and 16-foot dipper stick. Located for inspection in Louisa, Ky.

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2—No. 0 Thew electrics, shop Nos. 1716-7, full revolving, traction wheels (also 36 in. gauge railroad wheels) equipped with Westinghouse motors Nos. 2812674-5, compound wound, 250 volt, 72.9 amps., 1200 r.p.m., size 143861, 20 hp. Will equip with any type of motor desired. Used but one month.

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Type "B"

21-foot boom
14-foot dipper stick

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STEAM SHOVEL

in first-class condition in every respect. Full revolving straight traction type. Shovel used for digging coal. Has one standard dipper and dipper stick; one 30-ft. dipper stick with new standard bucket; 1½-yd. capacity. Offer very cheap. Write, wire or call

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2—24 in. gauge, Porter saddle tank.
1—15 x 26 Farrell jaw-crusher.
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2—350-ft. Air Compressors.
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Practically New. Immediate Delivery

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⅝, ¾ and ⅞ yd. Revolving Shovels. Rebuilt and ready for delivery.

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1—¾ cu. yd. Bucyrus, Model 18-B.

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3-ton Plymouth, gasoline, 24-in. gauge. In excellent overhauled condition.

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Haiss Path Digging type, self propelled, electric power. First-class condition.

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12-yd. and 16-yd. capacity.

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All cars absolutely guaranteed in condition and U. S. Safety appliance standard.

Our cars now leased by twelve railroad systems.

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Immediate Delivery

1—18 x 24 S.G. Mogul, Wt. on drivers, 43 ton.
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11—34 ft. S.G. Flat Cars.
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1—15 x 22 S.G., 6-wheel, Switch Type Locomotive.
1—11 x 16 S.G. Porter Saddle Tank.

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24-in., 36-in. and Standard Gauge

Steam Shovels—Dump Cars

1—5-ton Industrial Locomotive Crane.
1—10-ton American Hoist Crane.
1—20-ton, 8-wheel Industrial Crane.

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Steel Underframe

Immediate Shipment

All in A.R.A. Interchange Condition.
Capacity 60,000 lbs.
Length 40 feet.

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Capacity 80,000 lbs.
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Capacity 60,000 lbs.

44-ft. cars suitable for Bunk Cars.

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60,000 capacity, 36-ft. Box Cars.

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75—Standard gauge, 50,000 lb. capacity flat.
10—Cattle cars, metre gauge.
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1—Standard gauge box car.
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4—Metre gauge passenger coaches.

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2—32-ton Vulcan four-driver saddle-tank, used sixty days, built March, 1921.
1—40-ton 17 x 24 in. four-wheel switcher.
2—50-ton 18 x 24 in. six-wheel switchers.
2—NEW 25-ton six-wheel Porters, separate tenders, 36 in. gauge.
2—18, 14, and 10-ton Vulcans, 36 in. gauge.

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20—12-yd. Westerns, like new, std. gauge.
50—60,000-lb. capacity flat and box cars.
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1—Marion 36 steam shovel on traction wheels.
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2-in., 4-in. and 6-in. simple, duplex and centrifugal pumps, new 3-drum hoists, road-rollers, and tripod drills.

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2—3 ton Plymouth Gasoline Locomotives, 24 in. gauge, fine condition, shipment immediately.

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1—18-ton, 36 in. gauge Porter saddle tank locomotive, cylinders 10 x 16, 160 lb. working pressure, first-class condition. Bargain.

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Locomotives, Track Accessories, Steam Shovels, Engines, Boilers, Pumps, Air Compressors, Machine Tools, Motors, Tanks, Pipe, Steel Piling.

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1—13 x 18 American (Canadian Works) std. gauge Saddle Tank. Built new Dec. 1913. Type 0-4-0 MCB, and ICC. 165 lb. steam. Full extended tank. Westinghouse Air Pump and straight line air. Overhauled and equipped with set of new tires, and repainted.

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Caterpillar traction, steam power
Entirely rebuilt
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Worthington Duplex compound, 630 gal. per min. Underwriters requirements.

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250 tons Relaying 60 lb. Rails.
200 tons Relaying 70 lb. Rails.
225 tons Relaying 80 lb. Rails.
4000 feet 16 lb. 24 in. Portable Track.
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RELAYING RAILS
2000 tons 56-lb. Rail and Angle Bars.
2000 tons 60-lb. Rail and Angle Bars.
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We can make immediate shipment of this rail and quote you an exceptionally low price. Please wire for particulars.
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RAILS
120 tons 50 lb. — 280 tons 80 lb.
200 tons 55 lb. — 545 tons 85 lb.
1500 tons 60 lb. — 170 tons 90 lb.
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Complete with all accessories.
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1000 tons, 56 lb. Relayers with Angle Bars. Immediate shipment from stock.
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Approximately 10,000 ton 100 lb. Relaying Rail with angle bars to match — Virginia delivery.
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250 ton, 56 lb.-60 lb.
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200 tons, 70's A.S.C.E. with Angle Bars—equal to new; quick shipment from stock.
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NORTH TONAWANDA, N. Y.

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15—Lakewood Tunnel Gates.
12—24 in. Gage Lakewood Road Car Chassis.
1200 ft. 24 in. Gage, 20 lb., Lakewood Riveted Track, with Pressed Steel Ties.
4—Complete Turnouts.
120 ft. Curved Track, 30 ft. radius.

IRWIN & LEIGHTON
Contractors
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Marion Shovel, Mod. 76, 3 yd. Rock Dipper
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5 and 10-ton **Steam Locomotive Cranes**
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10 in. four-wheeled **Locomotives**, standard gauge
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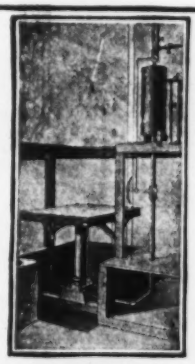

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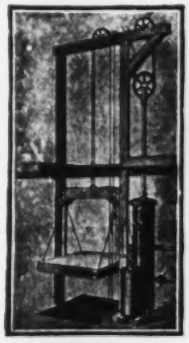

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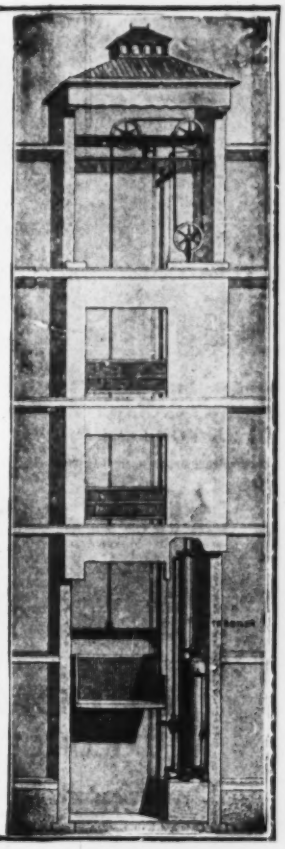

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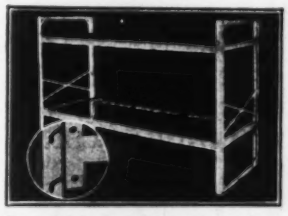

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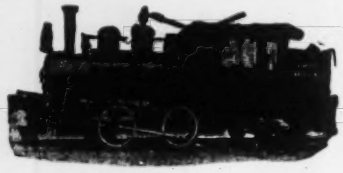

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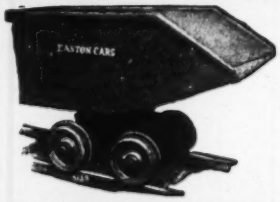

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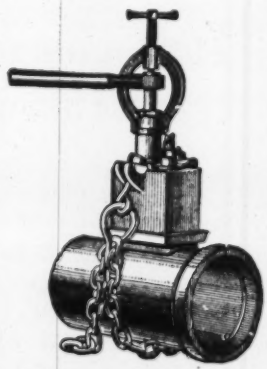

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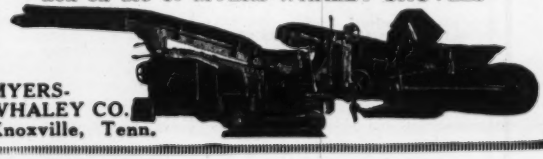

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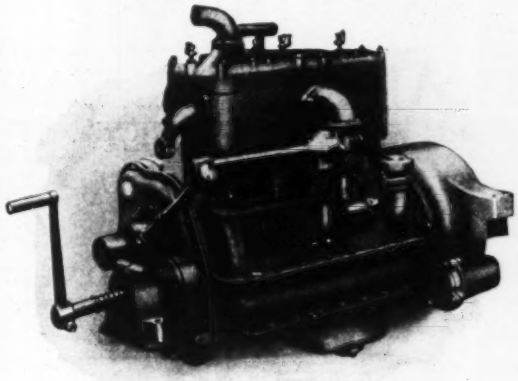

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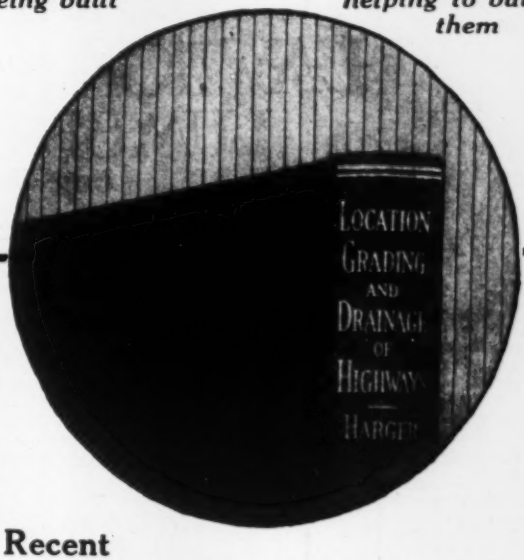

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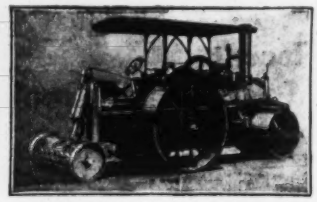

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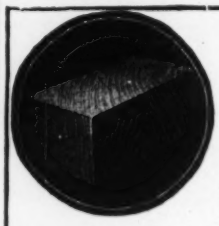

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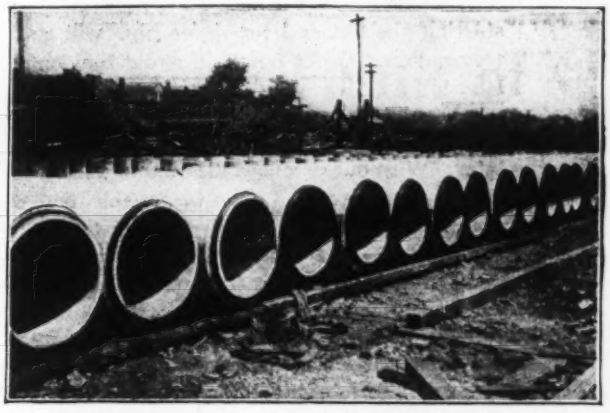

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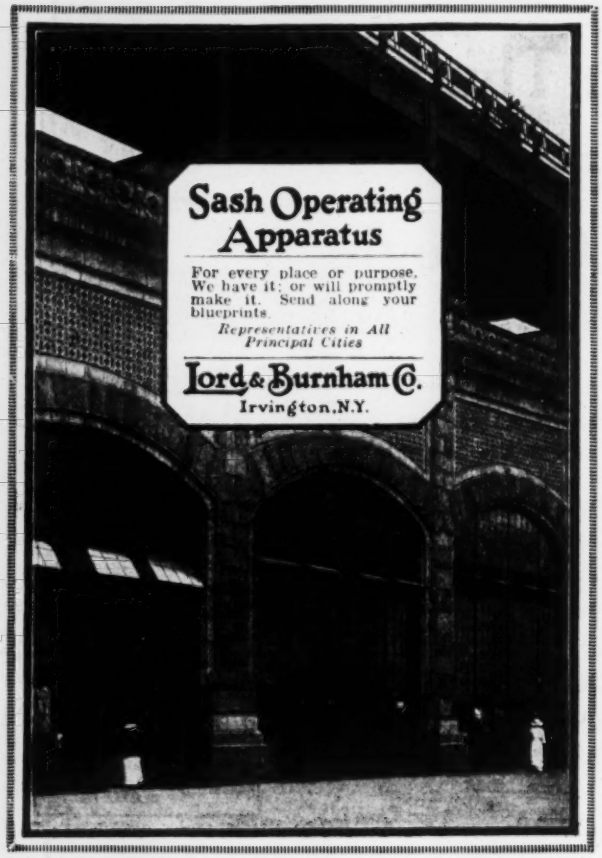

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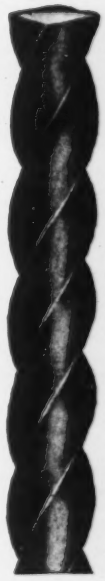

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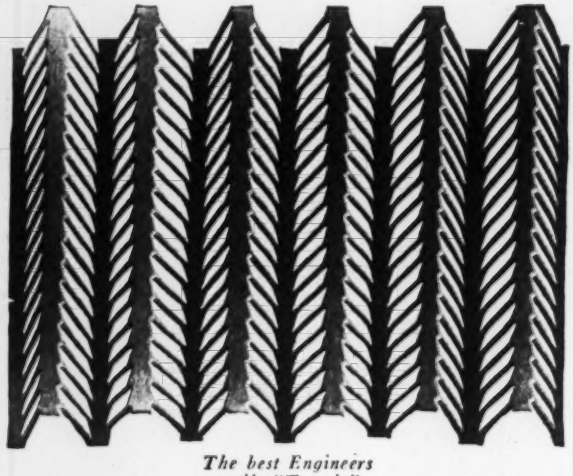

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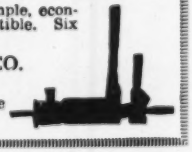

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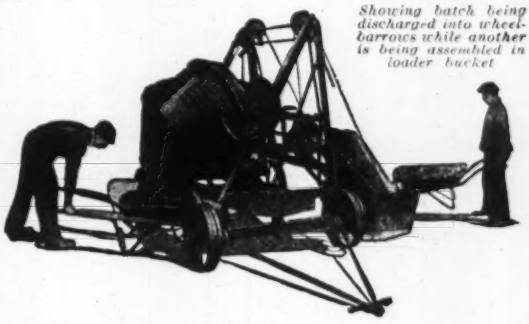

Showing batch being discharged into wheelbarrows while another is being assembled in loader bucket

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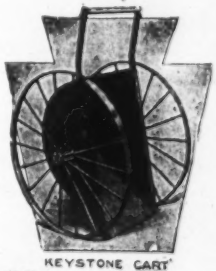

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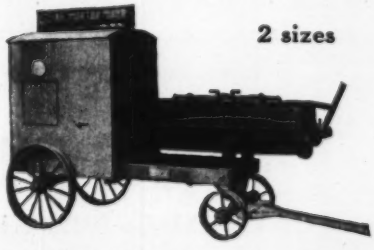

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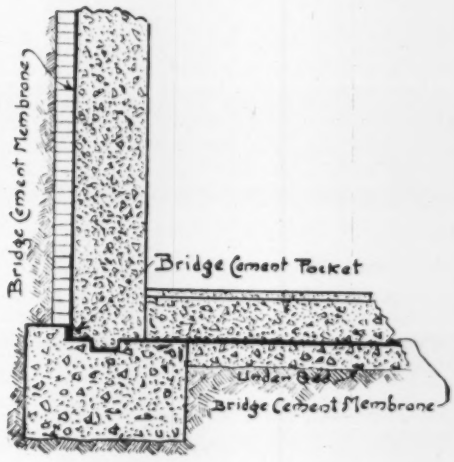

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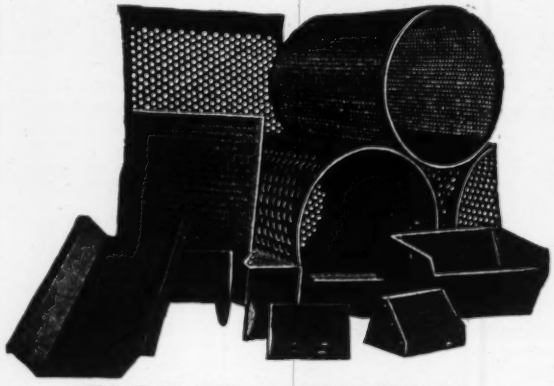

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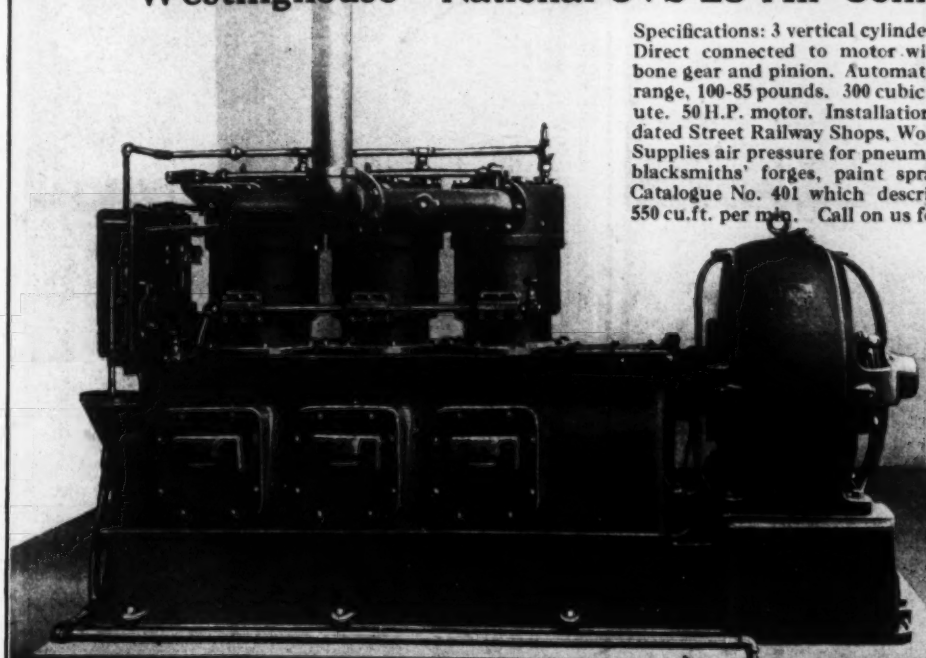

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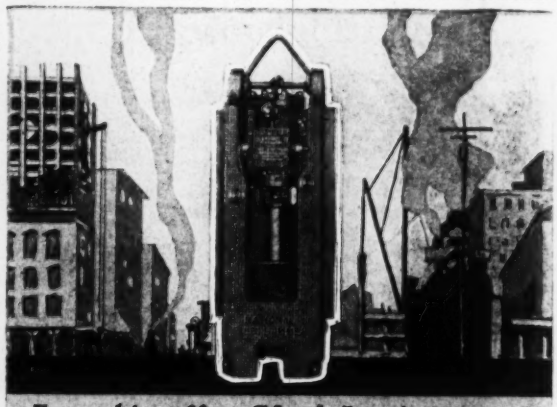

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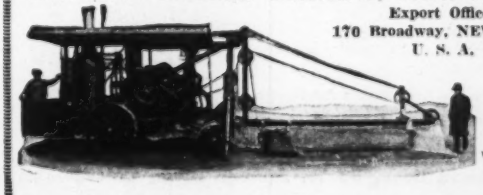

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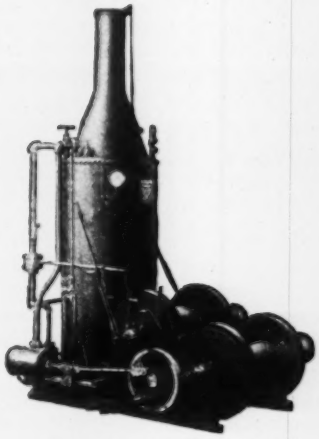

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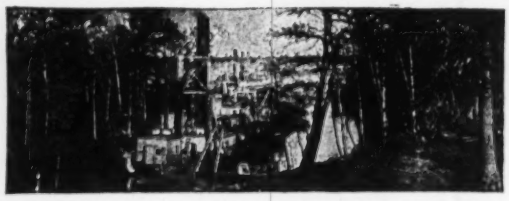

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The material and workmanship that is a part of every Leschen Wire Rope, make it safe, dependable and economical.

ESTABLISHED 1857

A. Leschen & Sons Rope Co.
St. Louis Mo.
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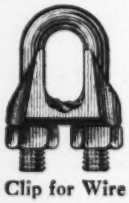

Plain Clip for Wire Rope and joining square or distorted bars. Universally used and recommended.

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On a Casting

—means that it's made of Marion certified malleable iron, offering great resistance to shock, having high elastic limit, resisting oxidation, wears better, is free from slag holes, shrinkage cracks, etc., and is not subject to fatigue or crystallization.

Malleable iron castings for every purpose

The Marion Malleable Iron Works

Marion, Indiana

Crescent Wire Rope

WIRE Rope of every kind and for every purpose—Accessories, too. Let us send catalog and quotations.

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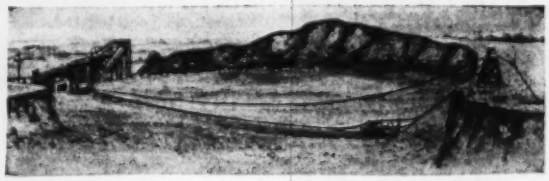
SAUERMAN POWER SCRAPERS

For Gravel Pits and General Excavating Work



Operated by one man with a double-drum friction hoist, a Sauerman Power Scraper will excavate and convey as much material as 6 to 15 men with teams and slip scrapers. Handling capacity varies according to size scraper used and length of operating span. Usual operating span is 200 to 500 feet. Ask for Pamphlet No. 10.

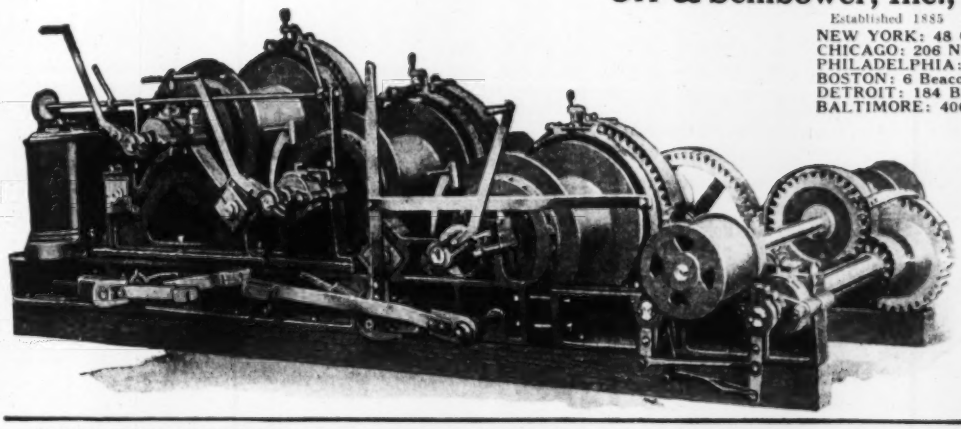
Sauerman Bros., 53 W. Jackson Blvd., Chicago

Remember this

O&S

when you want an A.C. or D.C. Hoist that says the last word on speed economy and control of bucket operation! It has many special features.

Orr & Sembower, Inc., Reading, Pa.



Established 1885
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FOR EFFICIENCY'S SAKE—JUST MAKE SURE IT'S AN O & S PRODUCT

Dobbie Derricks and Hoists

Stock of Fittings, Blocks, Sheaves, Winches, etc., carried by our agents—
G. S. Green Co., New York.
Beckwith Machy. Co., Pittsburgh.
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P. I. Perkins Co., Boston.

DOBBIE Foundry & Machine Co.
Manufacturers
Niagara Falls, N. Y.

Bucket excavation demands great flexibility of line control—just the thing you get in this

MUNDY

it's also speedy
Write for catalog

J. S. Mundy Hoisting Engine Co.
Established 1869 **Newark, N. J.**

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"TOLEDO CRANES"

Stop Man Power Waste

"Toledo" standards guarantee, latest practice in design; positive engineering and accuracy; smoothness; speed and power with flexibility and economy in operation.

What are your requirements?

THE TOLEDO CRANE CO.
Bucyrus, Ohio
Successors to
The Toledo Bridge & Crane Co.

Proportioned for Fast Work

Every detail of the Stroudsburg Engine is designed to take full advantage of the 125 pounds boiler pressure.

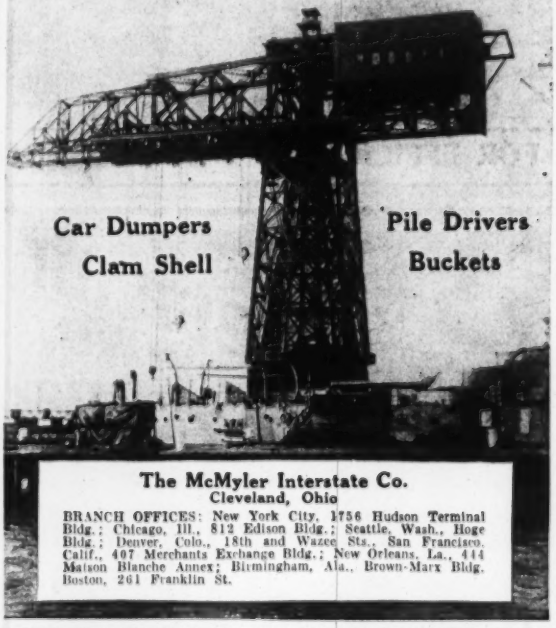
Stroudsburg Hoisting Engines

Ask any Stroudsburg user what kind of service he gets—from the engine and the works.

STROUDSBURG ENGINE WORKS
66 North 3rd Street, Stroudsburg, Pa.

LOCOMOTIVE CRANES
CLAM SHELL BUCKETS - SHIPBUILDING CRANES
CAR DUMPERS PILE DRIVERS
THE McMYLER INTERSTATE CO.
CLEVELAND OHIO

CRANES
of all types and sizes
from the smallest locomotive crane to the giant shown here. ***Send for Bulletin***



The McMyler Interstate Co.
Cleveland, Ohio
BRANCH OFFICES: New York City, 1756 Hudson Terminal Bldg.; Chicago, Ill., 812 Edison Bldg.; Seattle, Wash., Hoge Bldg.; Denver, Colo., 18th and Wazee Sts., San Francisco, Calif., 407 Merchants Exchange Bldg.; New Orleans, La., 414 Maison Blanche Annex; Birmingham, Ala., Brown-Marx Bldg. Boston, 261 Franklin St.

CLEVELAND CRANES

What's the size of the crane you are figuring on?

If it's anywhere from 250 lbs. to 500 tons CLEVELAND, of course!

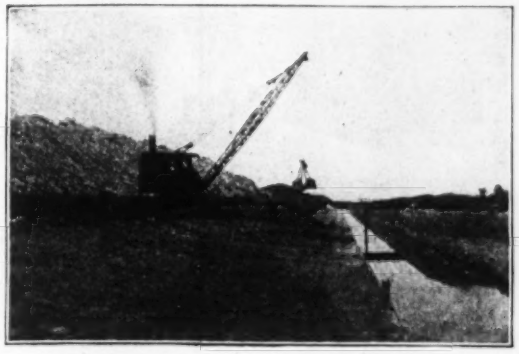
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE, O.

SLUICING EXPERTS

LEWIS-MORSE SHEERBOARD METHOD SAVES TIME AND COST

REGRADING — BUILDING DAMS, EMBANKMENTS, LARGE FILLS, ETC.
WRITE US
SLUICING DEPT. — (FORMERLY LEWIS, WILEY & MORSE)
PUGET SOUND BRIDGE & DREDGING CO., SEATTLE.

INDUSTRIALS



In the Calumet Sag Channel "Industrial" Cranes were used with drag line bucket for surface excavating and with grab buckets for excavating and building retaining walls, for spotting cars, unloading coal, etc.

We have augmented the "Industrial" crane family by the addition of our Type BC Crawling Tractor Crane. This crane is pre-eminently adapted to the needs of road contractors, coal dealers, gravel, sand and stone producers and moderate size manufacturing plants.

The 48 years' experience which we have had in building standard cranes and special cranes for special work has been utilized in the development of the Type BC "Industrial" Crawling Tractor Crane.

We would be pleased to furnish detailed specifications covering this type of crane upon request.

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Products: Locomotive, Electric and Wrecking Cranes, 5 to 150 tons capacity. Pile Drivers, Pivot Cranes, Transfer Cranes, Rail Saws.

TERRY

For a quarter of a century building the highest type
CRANES and DERRICKS

Write for catalogue.

Terry Tractorcrane

A speedy and rugged crane requiring no outriggers, swinging through an arc of 300 degrees.

TERRY

MANUFACTURING COMPANY
Grand Central Terminal
New York City
Plant—Kearny, Newark, N. J.

Just one of over 50,000 LIDGERWOOD HOISTS

Built and used throughout the world

The illustration shows one of a number of Lidgerwood Hoists, operating the derricks used in the construction of the Knoxville Light & Power Co., across the Tennessee River.

A Lidgerwood Cableway was also used in the construction of this dam.

The speed and strength of Lidgerwood Hoists enables the contractor to speed up his entire work, lower cost and increase profit.

DERRICKS—CABLEWAYS
HOISTS

Send for Catalogs

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Chicago, Pittsburgh, Philadelphia, Cleveland, Detroit, Charleston, W. Va., Los Angeles, San Francisco
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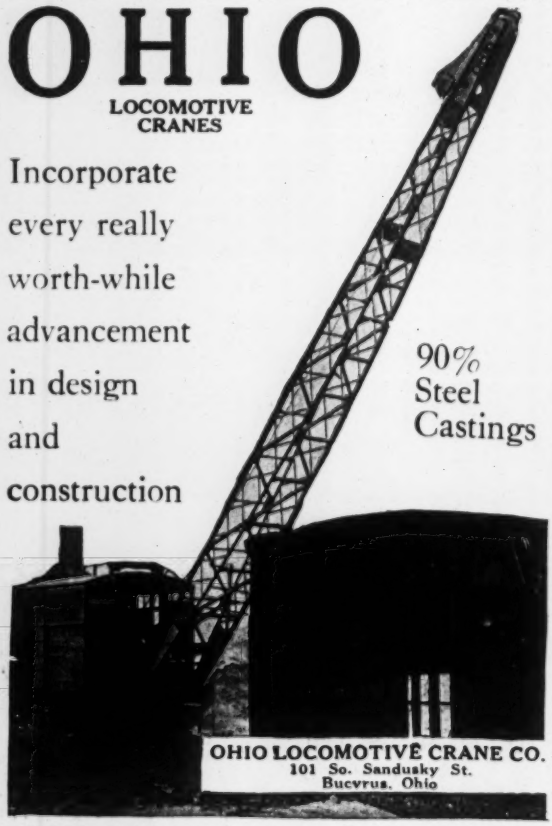
OHIO
LOCOMOTIVE CRANES

Incorporate every really worth-while advancement in design and construction

90% Steel Castings



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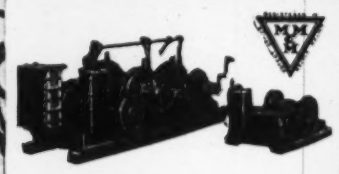
Bucyrus, Ohio

MEAD-MORRISON
LIFTS THE LOAD OF INDUSTRY



A Fast Rig

Mead-Morrison Electric Derrick Hoists
are so arranged that in ease and speed of operation they are unsurpassed. All operating levers are brought together at a central, convenient point making it unnecessary for the operator to be continually on the move. An Automatic, Mechanical Brake ensures safety. The Independent Swinger allows simultaneous Swinging and Hoisting, increasing the day's productive hours.

Write for complete information

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MANUFACTURING COMPANY
629 Prescott St., East Boston, Mass.
Branch Offices:
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Some One Wants to Buy
the equipment or machinery that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

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In difficult work the
O. S. Dependable Locomotive Cranes and Buckets
insure satisfaction
Correct Design, Right Material, Superior Fabrication

Orton & Steinbrenner Co.
Chicago, Ill.
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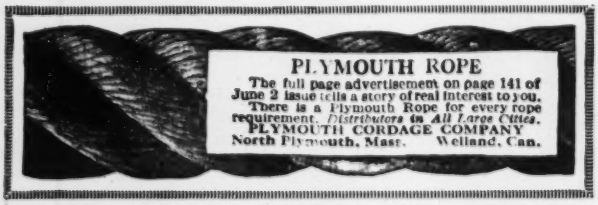

PLYMOUTH ROPE
The full page advertisement on page 141 of June 2 issue tells a story of real interest to you. There is a Plymouth Rope for every rope requirement. *Distributors in All Large Cities.*
PLYMOUTH CORDAGE COMPANY
North Plymouth, Mass. Welland, Can.

ROEBLING
Wire Rope — Wire Rope Fittings — Welding Wire
JOHN A. ROEBLING'S SONS COMPANY, Trenton, N. J.

GRAY STRAND WIRE ROPE
ELECTRICALLY WELDED WIRE
Wickwire Spencer Steel Corporation
Worcester, Mass. Buffalo, N. Y.
District Offices and Warehouses
New York Philadelphia Detroit Chicago Boston
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HAYWARD
Orange Peel Buckets—the fruition of thirty-five years' experience in building better buckets. Three- or four-sided types with or without cut-off blades. Ask for Catalog 43. 2453-Y
The Hayward Co., 48-50 Church St., New York
BUCKETS

WILLIAMS' BUCKETS

Make Full Production Possible

This ¾ yard Favorite Bucket is unloading sand, gravel and crushed stone from cars to loading hopper, on road construction work near Detroit, Mich.

The speed and easy manipulation of the Favorite made it a favorite in fact as well as name. It's built into the work. When it stops all work stops on this job. BUT IT KEEPS ON DIGGING—thus making full production possible—

In fact it's built to dig and last while digging.

Write for full particulars today.

G. H. Williams, Erie, Pa.
Room 317, 30 Church St., New York City

For Digging or Dredging

we can furnish you buckets that will satisfy you in every way. With a minimum number of parts and husky make-up they are easily operated and stay on the job.

There are years of experience behind these buckets and we are prepared to fill your order from stock at reasonable prices.

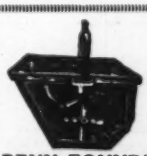
Catalogue on request

Vulcan Iron Works, Inc.
Jersey City, N. J.

Aden Grab Buckets

are so constructed that the counterweight does not come in contact with material, thereby insuring a greater digging power and absolutely no loss of power at any stage of the closing action. *Write for further information.*

The Advance Engineering Co.
Offices: 6543 Metta Street
Cleveland, O.



Dumping Buckets of all types, Industrial Cars, Skips, Portable Tar Heaters, Lead Melting Furnaces, Carts for hauling Concrete, Coal, Ore, etc., Forgings and Foundry Equipment.

Iron Castings **Aluminum Castings**

All kinds of Steel Plate Work up to ⅝-in. thickness.

PENN FOUNDRY & MANUFACTURING COMPANY
Hill Crest, Reading, Pa.

Kiesler Clam Shell

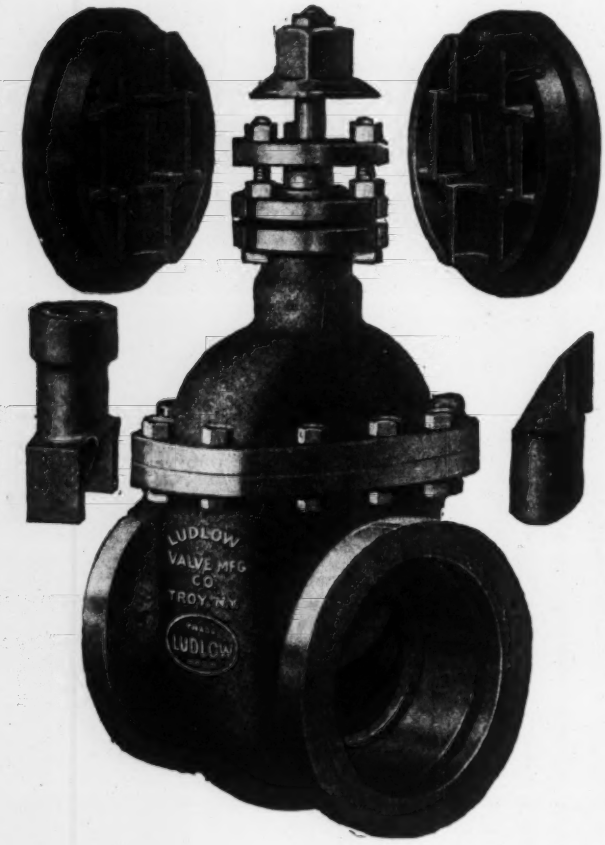
The Products of 25 Years of Specialized Experience

Kiesler non-lifting clam shell buckets operate on the Multi-system bell crank lever principle and are superior to any other buckets on the market.

They are mechanically perfect—a test will quickly demonstrate for you a reliability, a capacity and efficiency that cannot be equalled—Send for our bulletins.

Clam Shell
Clam Shell Scraper
Orange Peel Buckets

Jos. F. Kiesler Co.
928 W. Huron Street
Chicago, Ill.



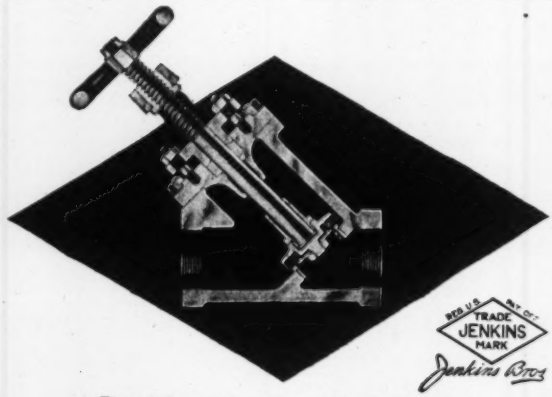
If you want a Valve that *never* develops trouble in opening or closing and that works equally well with pressure either side of the gate—here it is. Reasons?

Send for 200-page Catalog

The Ludlow Valve Mfg. Co.

Troy TRADE LUDLOW MARK **New York**

BRANCHES: New York, 62 Gold Street; Boston, 112 Water Street; Philadelphia, Harrison Building; Pittsburgh, First National Bank Building; Chicago, 633-635 The Rookery; Kansas City Office, R. A. Long Building.



Buy "signed" valves—with the Jenkins Diamond Mark and signature on the body.

FIGURE 296
(screwed)

Fig. 297—flanged

Jenkins Iron Body Y or Blow-off Valve, standard pattern for 150 pounds working steam pressure, or 250 pounds working water pressure. Fitted with Jenkins Renewable Disc. Has full, straight opening almost in line with the pipe. Used for Boiler Blow-off service, and for handling thick fluids.

At all supply houses.

JENKINS BROS.
New York Boston Philadelphia Chicago Montreal London Havana
Factories: Bridgeport, Conn.; Elizabeth, N. J.; Montreal, Canada.

Jenkins Valves
SINCE 1864 2317-J

POWELL VALVES
(Especially the "White Star" Valve)

The Wm. Powell Co., Cincinnati, O.

We DESIGN and BUILD
Large* VALVES *"72-in. and Smaller"
For Hydro-Electric Plants
RENSSELAER VALVE CO.
Troy, N. Y., U. S. A.

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TEMPERATURE INSTRUMENTS
INDICATING · RECORDING · CONTROLLING

Tycos Engineering Aneroids, Pocket Compasses, Thermometers — every temperature instrument favored by the highest engineering standards is shown in the *Tycos* Catalog. Send for one.

There's a Tycos or Taylor Temperature Instrument For Every Purpose.

Taylor Instrument Companies
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PENCOYD STEEL & IRON CO.
Contracting and Engineering Specialties
Steel and Iron Castings—Forgings
Dredging and Water Supply Parts
Foundry—Machine Work—Special Castings—Forgings
Prompt Service Heavy or Light Parts
New York Office: 206 Broadway, New York City

COMPOUND METERS AND WATER RATES

"The first meter to measure all the water all the time"

Compound Meters and Water Rates

WATER rates have been going up all over the country. They will go still higher so that registration on all flows is needed to secure maximum revenue.

The Trident Compound produces the maximum revenue by measuring all of the water all of the time.

The Oil Enclosed Gear Train insures maintained operation and accuracy. Prevents clogging and corrosion. Standard on all Trident Compounds.

Neptune Meter Co.

50 East 42nd St., New York City

*Patents applied for

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Greater Accuracy *Longer Life* *Increased Revenue*

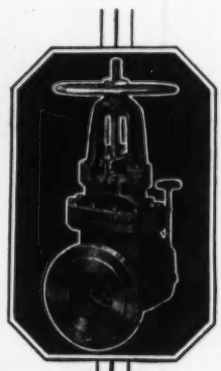
2,000,000 TRIDENTS in Daily Use

LUNKENHEIMER
Valves and Engineering Appliances

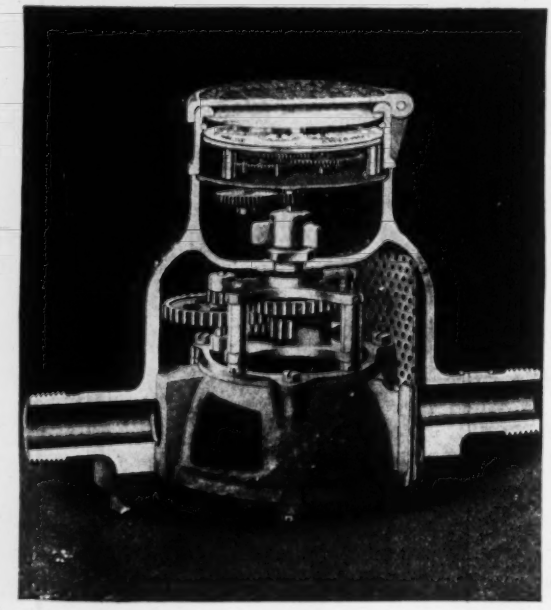
GLOBE, GATE, CHECK, POP SAFETY, BLOW-OFF, THROTTLE, SAFETY NON-RETURN VALVES, ETC.

THE LUNKENHEIMER CO.
"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
NEW YORK CHICAGO CINCINNATI BOSTON LONDON
EXPORT DEPT. 129-131 LAFAYETTE ST., NEW YORK

WATER COLUMNS, COCKS, WHISTLES, INJECTORS, LUBRICATORS, OIL AND GREASE CUPS, ETC.



SAFETY—ECONOMY—PERMANENCE

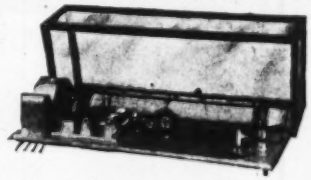


The Hersey Disc Meter, Model HF, is the product of thirty-five years of experience and refinement in the manufacture of water meters.

This model in the smaller sizes, together with Model HD in the larger sizes, form a series which excels all meters of all makes in all those essentials which go toward making up an exceptionally desirable meter.

HERSEY MANUFACTURING COMPANY
Boston, New York, Chicago, Columbus, O., Philadelphia, Atlanta, San Francisco

STEVENS
Water Level Recorders and Indicators



for water power plants, tides, irrigation, city water supply, sewers and drains.

Let Stevens Recorders plot your Hydrographs

Direct Acting, Long Distance, Duplex and Differential Recorders and Indicators, Transits and Levels.

Bulletins on request

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109 E. 70th St. N., Portland, Ore.

SIMPLEX METERS
Venturi Tube

For checking up reciprocating pump performance and determining slippage due to imperfection or wear in valves; for measuring delivery of centrifugal pumps and figuring pumping station efficiency; for distributing proportionately the cost of water supplied to several districts; for checking up the performance of filter beds; for detecting waste; for recording daily amounts of sewage handled, and planning future extensions, etc., etc.

SIMPLEX VALVE & METER CO.
5722 Race St., Philadelphia, Pa.

Nicholas Engel
JOHN FOX & CO.
Cast-Iron Water, Gas and Flange Pipe, Special Castings, Fire Hydrants, Valves, General Foundry and Machine Work.
253 BROADWAY NEW YORK CITY

KENNEDY
Water Gates, Fire Hydrants, Gate Valves
have demonstrated their efficiency, reliability and low maintenance cost in installations throughout the country. 500 different sizes and types. Send for Catalog.
The Kennedy Valve Mfg. Co., Elmira, N. Y.
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SLUICE GATES
Shear, Flap and Butterfly Valves
FLEXIBLE JOINTS
COLDWELL-WILCOX CO
NEW WINDSOR NEWBURGH N.Y.

Liquid Chlorine
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WATER METERS

Accurate
Durable
Efficient

GAMON METER COMPANY
Main Office and Works:
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Water Meters for all Domestic and Industrial Services

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WOODWARD WATERWHEEL GOVERNORS

Built in All Types and Sizes from the Smallest to the Largest

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208 Mill Street Rockford, Illinois

A. D. COOK, LAWRENCEBURG, INDIANA

Manufacturer of

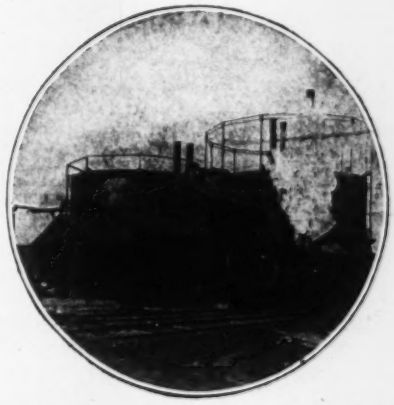
Steam and Power Deep Well Pumps, Single and Double Acting, Cook's Patent Brass Tube Well Strainers, Deep Well Cylinders, Sucker Rods and Well Tools. Deep Well Pumping Systems installed complete.

Write for Catalog No. 11-6.

Cook Deep Well Products have always been manufactured by A. D. Cook. The Cook Well Company of St. Louis, Mo., a selling organization, has retired from active business and has transferred its good will to A. D. Cook. Customers of the Cook Well Company will receive direct service by writing to A. D. Cook, Lawrenceburg, Ind.

VENTURI

VENTURI GAS METERS



THE VENTURI STATION GAS METER has been installed in numerous municipal gas works because of the following convincing reasons:

1. It is accurate.
2. It occupies very little space.
3. It registers, records and indicates the flow of gas.
4. The capacity may be increased at small cost.
5. The initial cost and installation cost are moderate.

Should your gas plant require a new station meter or if it is not equipped with one at present, we would like to supply you full information about the Venturi.

Send for Bulletin No. 86

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Providence, R. I. **U. S. A.**

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FILTERS

DRY FEED
CHEMICAL MACHINES

Write for Bulletins 19-2-3

The total daily capacity
of municipal filtration plants
installed by us is
ONE BILLION GALLONS
Supplying 500 communities

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Originators of Mechanical Filtration

Member Associated Manufacturers of Water Purifying Equipment.

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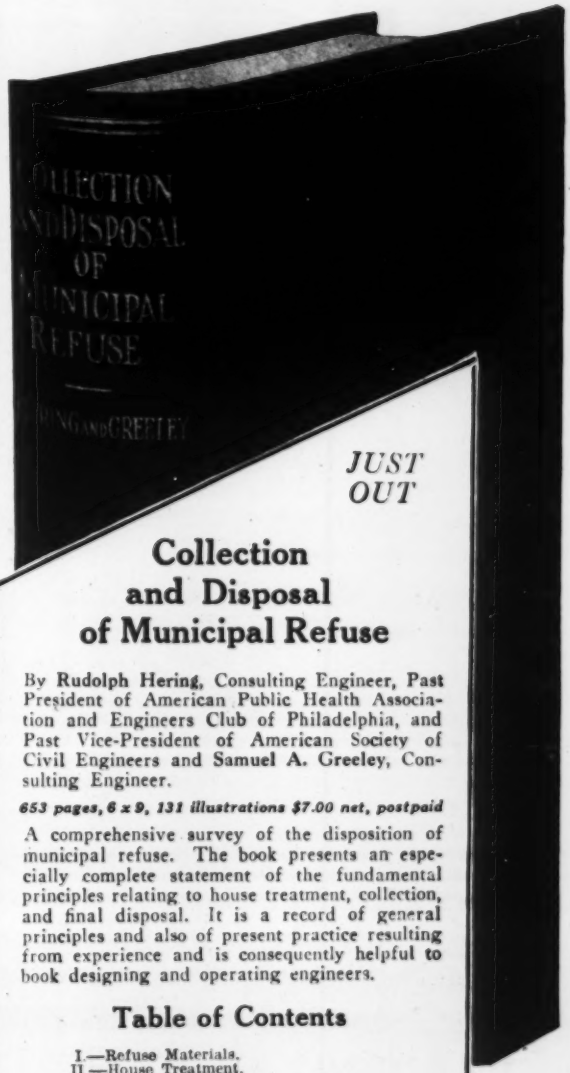

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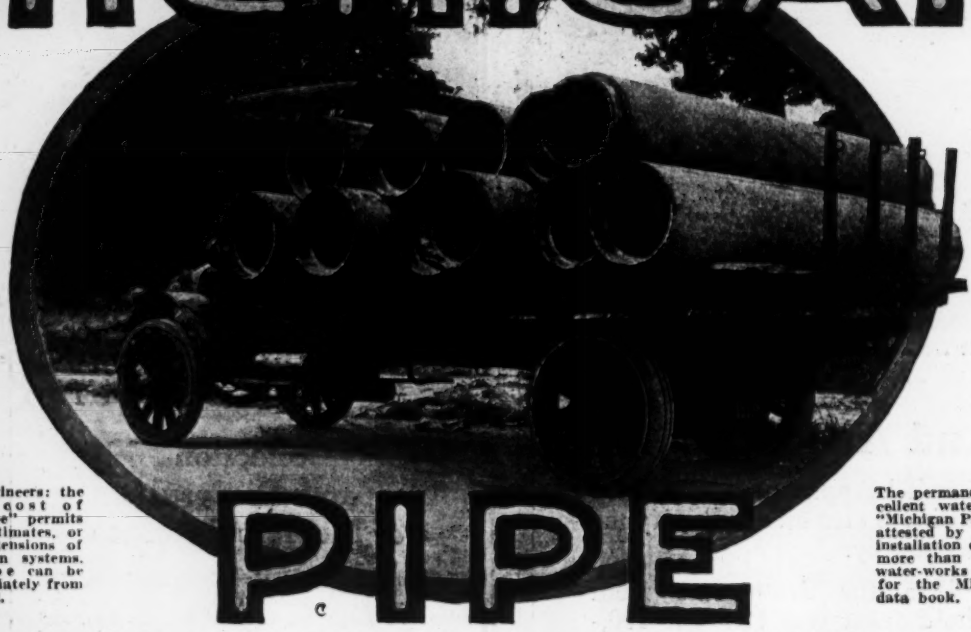

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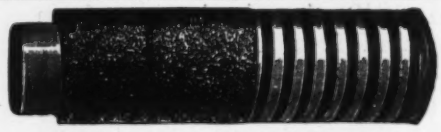

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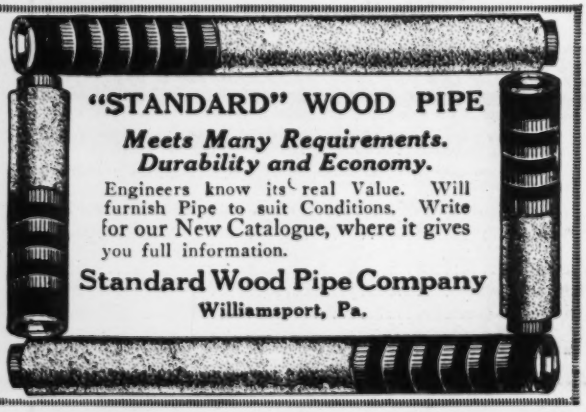

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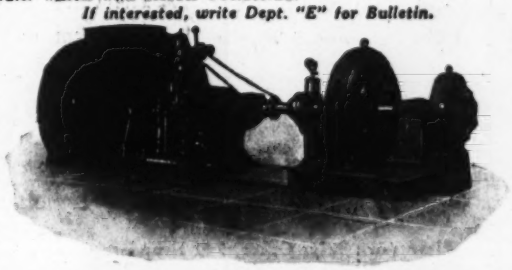

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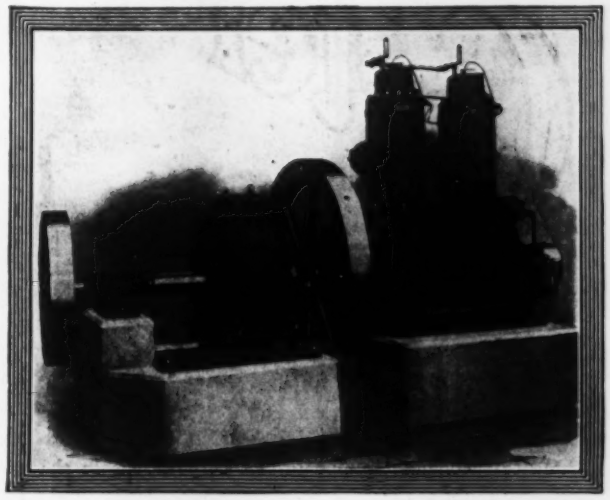

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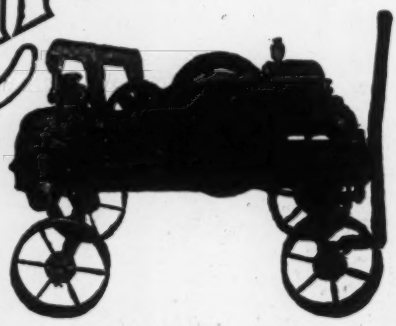

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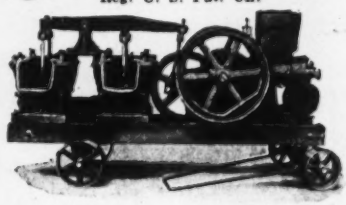

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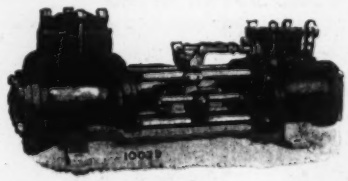

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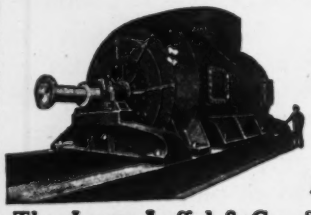

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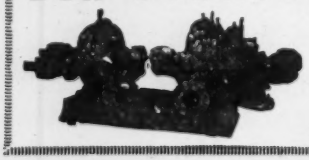

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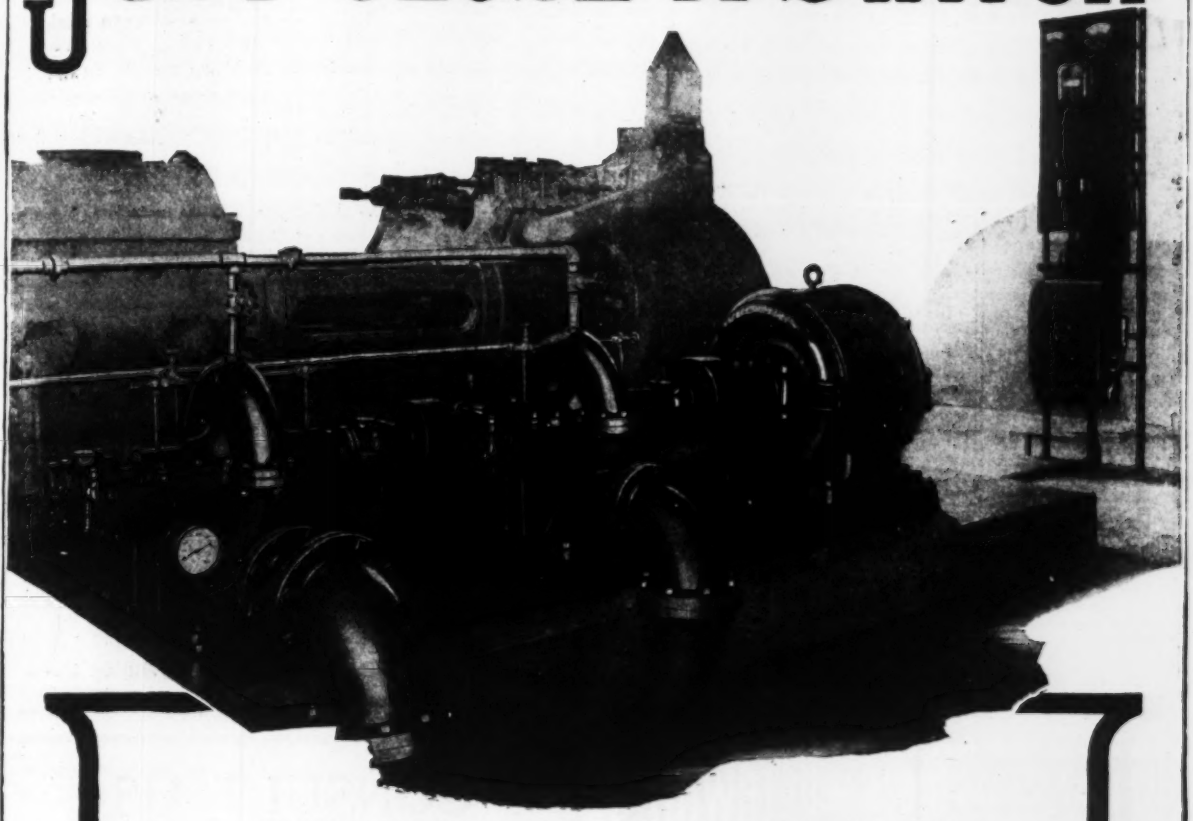

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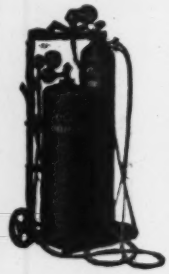

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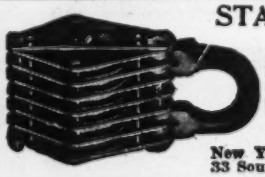

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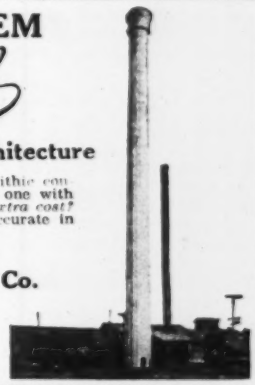

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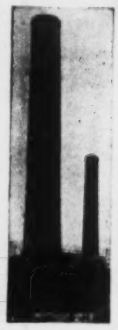

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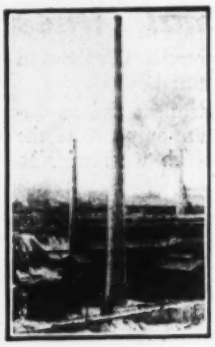

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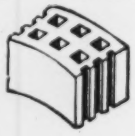

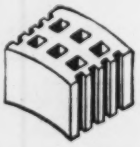

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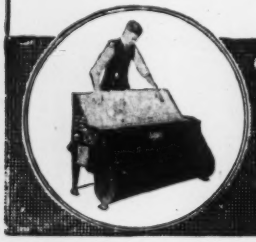

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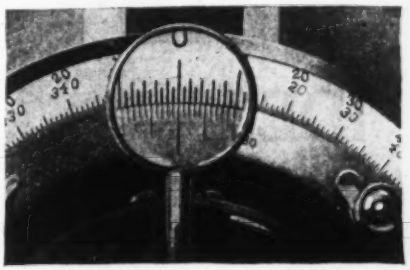

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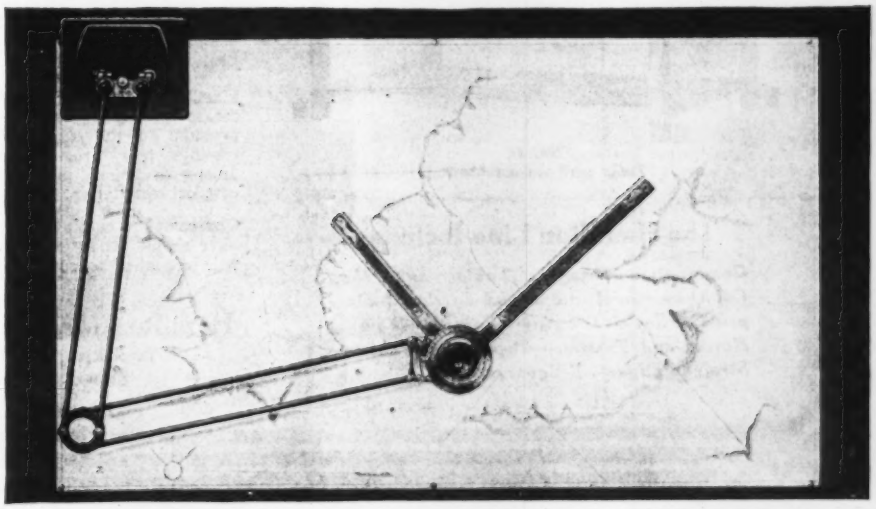

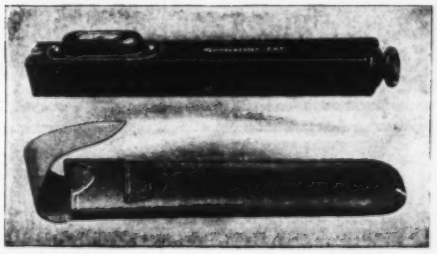

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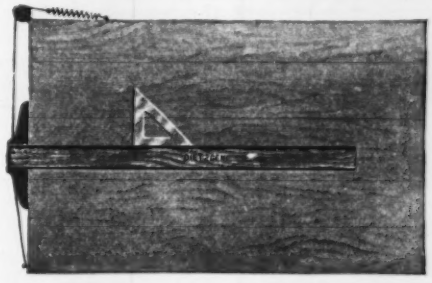

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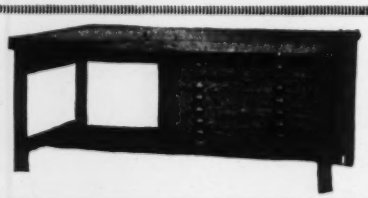

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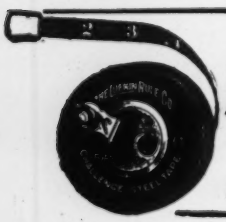

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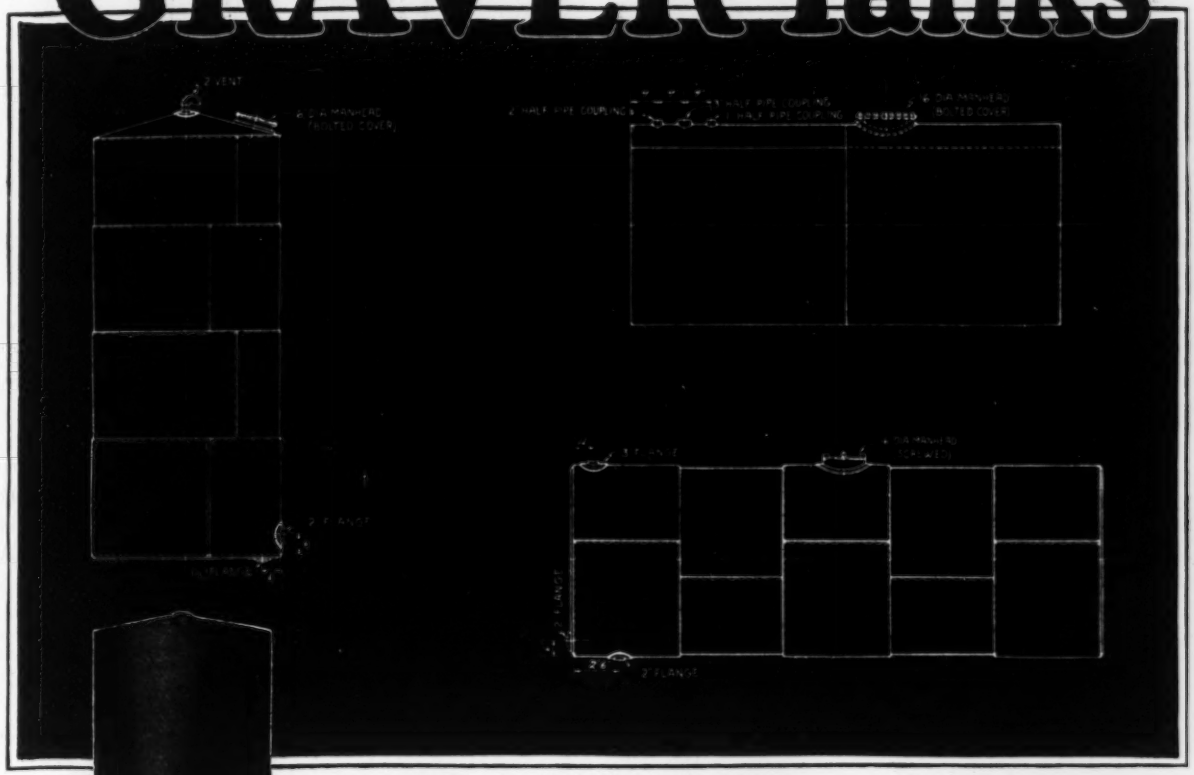

Blue print shows location of manheads and flanges

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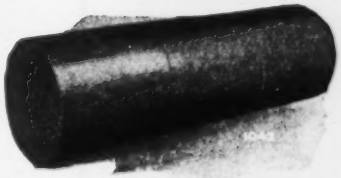
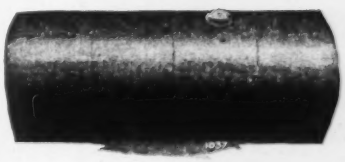


Horizontal Riveted Tanks—Flat heads of ¼" steel, shell ⅜" fitted with one 16" manhead with bolted or screw cover and three 2" flanges or equivalent for pipe connections. Also with ¼" heads and ¼" shell. Capacities 4000 to 24,600 gals.



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(See Pile Hammers, Steam)

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Graver Corporation
Lakewood Engr. Co.

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Lakewood Engrg. Co.

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Byers Mach. Co.
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National Hoisting Eng. Co.
Orr & Sembower, Inc.
Stroudsburg Engine Works

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Gray Iron Foundry Co.
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Ingersoll-Rand Co.
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Mead-Morrison Mfg Co.
Mundy Hoisting Eng. Co., J. S.
National Hoisting Eng. Co.
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Ingersoll-Rand Co.
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Insley Manufacturing Co.
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Jacks, Lifting
McKiernan-Terry Drill Co.
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Leadite Co., Inc., The

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Porter Co., H. K.
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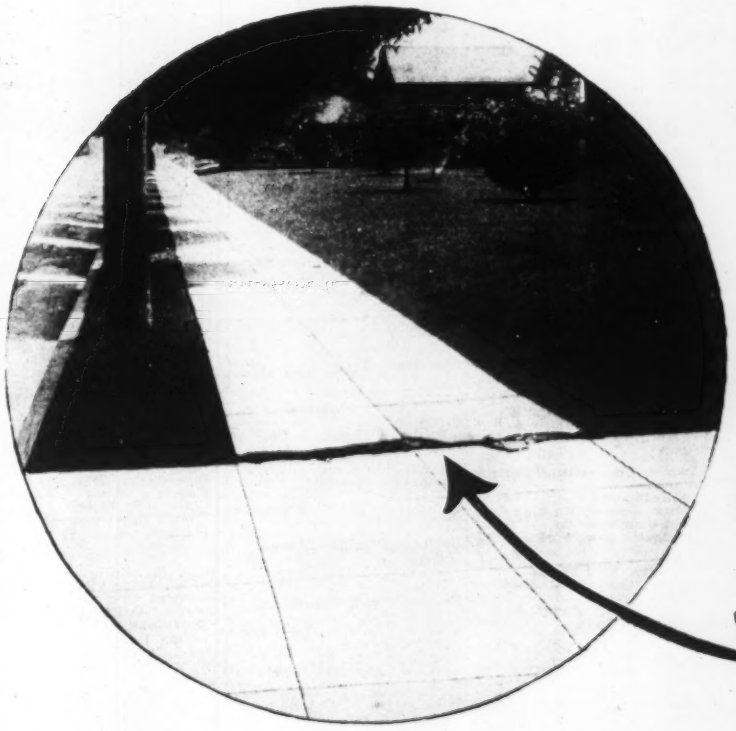

Save the sidewalk! from this

WHEN cement sidewalks are properly laid, the only thing that can cause an unsightly and destructive crack like this is lack of expansion space.

Avoid risks by building Elastite into your walks.

Elastite is made of tempered asphalt compound sandwiched between two layers of asphalt saturated felt.

They last as long as sidewalk or pavement because summer heat does not dry them out nor cause them to run, and cold weather does not cause them to become brittle.

They absorb all expansion of the walk, and they seal the joint when contraction takes place.

Elastite joint comes in any length, depth and thickness you desire.

Write for sample and prices.

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(See Steel Plate Construction).

No — 85% Magnesia Pipe and Boiler Covering is not fragile

Nearly everybody jumps to the conclusion that an article of light weight has little strength. The thoughts are naturally associated.

But the truth is that 85% Magnesia combines light weight and strength.

The illustration above, sketched from a photograph, shows a heavy man standing on a half section of 85% Magnesia Pipe Covering. Had you any idea that 85% Magnesia possessed such strength?— Do you doubt it? Then try it yourself.

Pipe coverings need not hang in shreds on the pipe to be considered as having failed. *The most frequent failure is sagging.* If the covering sags only $\frac{1}{4}$ of an inch it has failed.

As weight induces sagging, it is extremely important that a pipe covering be as light as possible. The rigidity of 85% Magnesia holds each section snugly to the pipe.

85% Magnesia combines light weight with great strength; one feature is not sacrificed for the other. This is one — only one — reason why 85% Magnesia is the *Universal* Coal Saver.

Other vital facts with respect to insulation are given in our revised book "Defend Your Steam," furnished free to every responsible person.

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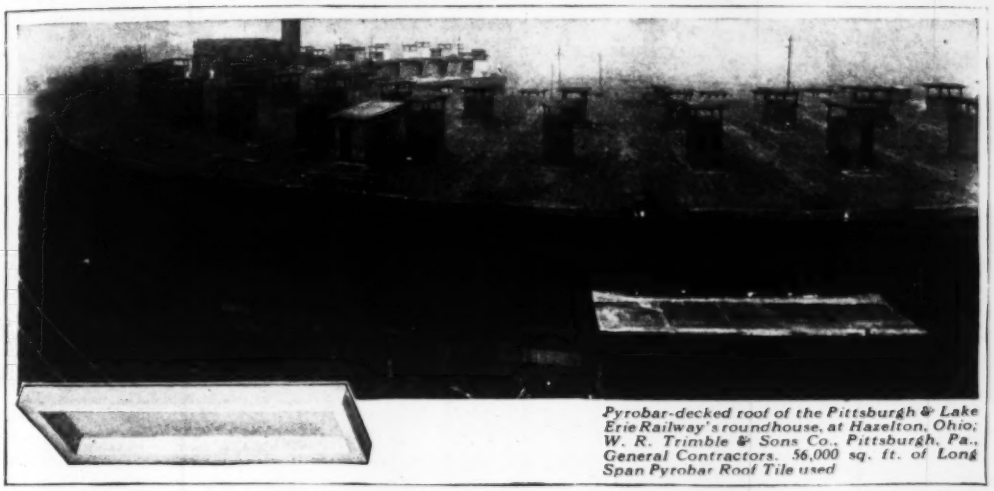

Pyrobar-decked roof of the Pittsburgh & Lake Erie Railway's roundhouse, at Hazelton, Ohio; W. R. Trimble & Sons Co., Pittsburgh, Pa., General Contractors. 56,000 sq. ft. of Long Span Pyrobar Roof Tile used

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Roundhouse and train shed roofs are constantly subjected to sulphur fumes from the stacks of locomotives. These sulphur dioxide fumes have a serious corrosive effect on roof decks which develop condensation on their under surface due to high heat conductivity.

The low conductivity of Pyrobar Roof Tile reduces the heat transmission and prevents condensation. There is no "sweating" or "dripping" to corrode the steel work.

In addition to this, exhaustive tests have proved that Pyrobar Roof Tile, instead of being deteriorated, are actually made stronger by exposure to sulphur dioxide fumes, and the reinforcement is in no way affected.

Pyrobar Roof Tile speed up the construction work. The large, light-weight units are easily and quickly placed. As soon as the steel is up the deck can be applied.

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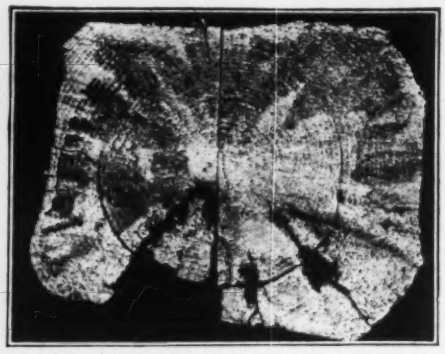
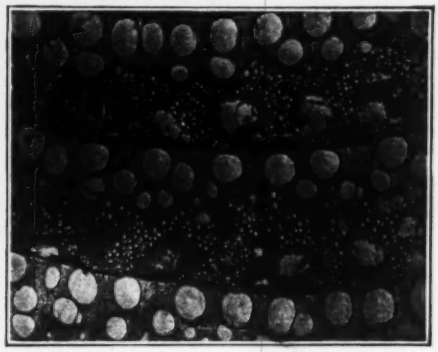


What the eye can see of decay

Cross section of yellow pine tie rotted by Lenzites sepiaria, a species of fungus quite common throughout the United States. (Reproduced by permission of American Wood Preservers' Association from their special publication, "Decay of Ties," by C. J. Humphrey, Pathologist, Bureau of Plant Industry—U. S. Dept. of Agriculture.)



What the eye cannot see

Photomicrograph of the cross section of three annual rings of chestnut greatly magnified. The small lighter areas, or spots, are decay pockets. (Courtesy, Department of Wood Technology, New York State College of Forestry, Syracuse, New York.)

Wood Decay—A Self Imposed Tax

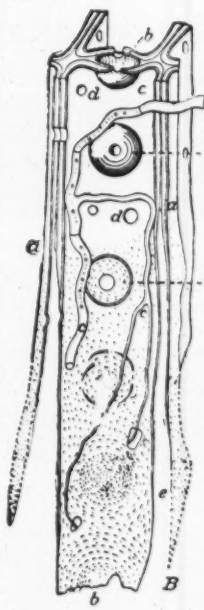
MOST repairs and replacements of structural timber are made necessary by wood decay. They are, to a large extent, a self imposed tax that could be saved by the simple expedient of wood preservation.

This applies to all timber placed in situations favorable to decay, where the mechanical life is greater than the natural life—to all unhoused structures, foundation timbers, wood exposed to humidity or in contact with the soil.

Carbosota Liquid Creosote Oil—the standard preservative for all non-pressure treatments—positively arrests the development of wood-destroying fungi. In proportion to the effectiveness of the treatment employed, it increases the durability of timber, equalizes the mechanical and natural life and reduces repair and replacement expense.

Non-pressure preservative treatment with Carbosota (applied by the Open Tank process, or Surface Treatments—dipping, spraying or brushing) should be every-day practice with all users of structural timber. It should be as common a custom as painting, for it is equally important. The result would be not only a substantial saving of money by the individual lumber user, but also an immediate, practical and powerful aid to the cause of timber conservation.

Further information regarding the use and benefits of Carbosota, and free technical assistance may be had by addressing our nearest office.



Fungus threads in pine wood. (Hartig.) a, cell wall of the wood fibers; b, bordered pits of these fibers; c, thread of mycelium of the fungus; d, holes in the cell walls made by the fungus threads, which gradually dissolve the walls as shown at e, and thus break down the wood structure.

Green wood cannot be effectively creosoted by non-pressure processes. It should be seasoned. All framing, drilling of bolt holes, etc., should be completed *before treatment*. If this is impossible, two brush coats of Carbosota should be applied to all untreated surfaces exposed by such subsequent cutting or drilling.

Barrett B Carbosota Liquid Creosote Oil For Preserving Wood

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